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ABSTRACT

A study was conducted to compare teaching and control patterns used by mothers of 4- to 6-year-old trainable mentally retarded (TMR) children to patterns used by mothers of nonretarded children, and to evaluate an analysis strategy identifying sequential behavior chains from observational data. Literature was explored on three topics: cognitive characteristics of TMR children, maternal attitudes toward handicapped children, and techniques for studying parent-child interaction. Ss were split into six groups consisting of the mother with the target child (either nonretarded, TMR, or older TMR) and a sibling of the target child; and each S group was given four experimental tasks (such as block stacking and sorting). Recorded were the proportion of time spent at each task and the number of transitions between each of six interaction patterns (such as elaborated explanation and residual patterns). Results did not support the major hypothesis that mothers teaching moderately retarded children would use more restricted patterns than mothers teaching nonretarded children (either of equal chronological age or of level of social competence). The negative finding may have been due to insufficient differentiation between elaborated and restricted interaction patterns. Analysis procedures demonstrated the value of the computer-based system for coding and processing data. (Tables, illustrations, pictures, and appendixes are provided.) (SB)

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Mothers as Teachers:
Instruction and Control
Patterns Observed in
Interactions of Middle-Class
Mothers with Trainable
Mentally Retarded &
Nonretarded Children

Diane Greenough Dolley
Final Report

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CENTER FOR INNOVATION IN TEACHING THE HANDICAPPED
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MOTHERS AS TEACHERS: INSTRUCTION AND CONTROL PATTERNS
OBSERVED IN INTERACTIONS OF MIDDLE-CLASS MOTHERS WITH
TRAINABLE MENTALLY RETARDED AND NONRETARDED CHILDREN¹

Diane Greenough Dolley

March 1974

(Final Report Number 7.32)

Center for Innovation in Teaching the Handicapped
Indiana University

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Mothers as Teachers: Instruction and Control Patterns
Observed in Interactions of Middle-Class Mothers with
Trainable Mentally Retarded and Nonretarded Children

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Abstract

This study compared teaching and control patterns used by middle-class mothers and trainable mentally retarded children to patterns used by middle-class mothers and nonretarded children and evaluated an analysis strategy identifying sequential behavior chains from observational data.

Research and theory suggesting deprivation in the environment of the retarded child were discussed. Models of mother-child communication under enriched and deprived conditions and communication patterns differentiating elaborated and restricted teaching styles were described. Techniques for observation of behavior and problems of identification and analysis of behavior strategies were outlined.

Each mother in the Control group worked with a four-through six-year-old nonretarded child; each mother in the Younger retarded group worked with a moderately retarded child matched with the Control group

on chronological age (CA); each mother in the Older retarded group worked with a moderately retarded child matched with the Control group on measured level of social competence (LSC). Each mother was observed with her Target child and a younger or older nonretarded sibling of this child. Thirty mothers were included in the study.

The first three tasks required increasingly complex mediation by the mother. In the fourth task, the child served as teacher as he communicated the task requirements to his mother.

From the hypothesized "defect" orientation of middle-class mothers toward their retarded children, a more restricted teaching style was expected of them than of mothers interacting with nonretarded children. Mothers interacting with retarded children were expected to resist the role of learners and to take more control of the interaction than would mothers working with nonretarded children.

Distinctions between groups appeared to be in the rate of behavioral change--the variability in the pattern per unit of time. All mothers used more interrogation and feedback than direct explanation. Mothers changed categories in the orientation and motivation of the retarded child more rapidly than did mothers working with nonretarded children. Whether this more rapid alternation successfully focused the retarded child's attention on the task or whether patterns were too fragmented to direct his attention to relevant aspects of the situation must be determined by further research.

The more rapidly changing use of elaborated and restricted patterns for mothers and nonretarded children than for mothers and retarded children

showed more differentiated use of explanation, interrogation, and feedback with apparently unimpaired children. Mothers teaching younger retarded children varied these patterns more rapidly than did mothers working with older retarded children, suggesting an effect of perceived defect in the retarded child that increases with his CA. Mothers and siblings of retardates used interrogation and feedback patterns at a level intermediate to that used with retarded children and with nonretarded Target children. Thus, strategies used with a moderately retarded child may also affect interaction with their nonretarded siblings.

Definition of restricted and elaborated codes by frequency and duration of patterns ignores the saving in time and talk that is an advantage of elaborated communication. Interaction of mothers and older children is often nonverbal and cooperative rather than verbally instructive because members of the dyad readily comprehend the task. The relationship between the apparent capability of dyad members and the verbal elaboration of their interaction appears to be a complex, nonlinear function of many variables. Duration and frequency of transitions in patterns may not differentiate elaborated from restricted communication styles and may be misleading since elaborated patterns need not occur often or be maintained long to influence behavior. Dependent measures should be sought which permit accurate differentiation of restricted and elaborated codes and are amenable to real-time coding of interaction.

FOREWORD

A prototype computer-based system for providing immediate feedback on teaching behavior to teachers and trainees was developed by the writer and his associates at the Center for Innovation in Teaching the Handicapped (CITH), Indiana University. The Computer-Assisted Teacher Training System (CATTS) represented a melding of cybernetic feedback theory and computer technology for the purpose of attacking some very difficult problems in teaching complex behaviors.

Early research with the system was devoted to increasing the sophistication of the analysis and feedback aspects by testing different feedback arrays and increasing the amount and variety of information being gathered and integrated. Demonstration of the system's great utility in a variety of educational settings adjacent to or far removed from the computer was similarly a concern having high priority.

As part of this research program, a study was planned which would use the capabilities of CATTS to change the teaching behavior of mothers in interaction with their trainable mentally retarded children. But there was little data to indicate what these mothers were doing, so it was difficult to know what modifications were desirable. A study seeking similarities and differences in the behavior of mothers with retarded and with nonretarded children seemed a necessary first step. Dolley's study represents an attempt to take that first step.

Although not using the feedback capabilities of CATTS, the study provides an opportunity to develop and evaluate data gathering and summary

techniques using CATTS components in unique ways; and a description and analysis model unlike any previously applied to interaction sequences was proposed and used in the selection of statistical analysis techniques.

From the information gathered, it appears that some of our strongly-held beliefs about the nature of the interaction of mothers with retarded children may be of questionable validity or may be upheld only by behavior much more subtle and more complex than we had supposed. Certainly we need more information before we can presume to suggest changes in the ways mothers and moderately retarded children behave toward and with each other.

Interest in the trainable and severely retarded has increased rapidly, particularly interest in educational and training programs to develop the capabilities of these individuals more fully. Yet many of the moderately and severely retarded are not served by educational programs in the schools or in privately supported centers. The informal training accomplished in the family is of major importance because of the greater amount and variety of interaction, greater control of reinforcers and earlier start that provide an advantage to parents and other family members. If we can identify and transmit optimal teaching strategies to parents of retarded children, then these critical opportunities for didactic interaction won't be lost, but will be used for the benefit of the child and his family.

M. I. Semmel, Director
CATTS Research and
Development Program

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CHAPTER I

INTRODUCTION

The socialization of the child is accomplished primarily by the family. A young child's mother is his major source of information about his surroundings (Parsons & Fox, 1952). She communicates to her child the aspects of the environment which are relevant to problems confronting him. In doing so, she keeps the child from being overwhelmed and confused by the impingement of irrelevant stimuli, and she provides a model from which her child can discover the utility of language as a tool for organizing thought. Bruner sees intellectual growth as the achievement of increased ability in the use of the mind. The new cognitive techniques "are not, in the main, inventions of the individuals who are 'growing up'; they are, rather, skills transmitted with varying efficiency and success by the culture--language being a prime example [Bruner, 1964, p. 1]."

Olim, Hess, and Shipman (1967) reported that the language style of the mother (more than the child's or the mother's verbal IQ) was the most important mediating factor in the child's conceptual development. Similarly, in a study of maternal teaching styles, Hess and Shipman (1965b) demonstrated that growth of cognitive processes is dependent upon the amount of information transmitted within the mother-child communication system.

Attempts to accelerate the learning of preschool "culturally disadvantaged" children (e.g. Weikart, Kamil, & Radin, 1964) or trainable mentally retarded children (Hottel & Dunn, 1958; Cain & Levine, 1963) have resulted in little improvement in the functioning of the participants in the programs over that shown by children who remained at home. Such results have often been interpreted as being indicative of the inadequacy of the intervention programs studied (Jensen, 1969). It may be, however, that these "negative" results do, in fact, demonstrate the power of the mother-child teaching situation which is operative in both experimental and control groups. The most carefully designed educational programs aimed at increasing skills in critical areas of functioning might have little impact in comparison.

Many important determinants of the adequacy of maternal instruction of the child appear to lie in the nature of the family structure within which the interaction occurs. For example, the presence of a severely retarded child represents a challenge to the continued functioning of a family. Farber (1964) has characterized the crisis reaction of these families as being one of two types. The first of these, the tragic crisis, appears to be more common to families of high socioeconomic status (Farber & Ryckman, 1965). In these families, the handicap is viewed as preventing the fulfillment of the parents' hopes and aspirations. In contrast, lower socioeconomic status families seem to be more vulnerable to the second reaction, a role organization crisis, in which the primary concern is coping with the apparently endless care problem represented by the handicapped child (Farber & Ryckman, 1965).

These descriptions of the means by which parents respond to the information that their child is severely mentally retarded are congruent with the theoretical conceptualizations of family functioning presented by Parsons (1951, 1961). The family is seen as a social system which must maintain an equilibrium between previously accepted value patterns or norms and new patterns of functioning demanded by changing situational pressures. The presence of a deviant member in such a unit causes a disturbance of this equilibrium which forces change in the roles played by other members. Illness represents one form of deviance in which one member of the family assumes a "sick role" (Parsons, 1951; Parsons & Fox, 1952).

According to Parsons (1951), when faced with the presence of a deviant member in a social group, each of the other members has available three means of attempting to re-establish the equilibrium between his expectations and reality. He may deny the existence of the needs which are being frustrated, become attached to someone else who can meet his expectations, or try to redefine his value orientation so that the frustrated values have diminished importance. According to Parsons, a compromise solution is frequently reached so that the frustration is reduced, although not eliminated.

Hence first, ego may not abandon his cathexis of alter by substituting an alternative object, but may retain his cathexis, but this cathexis can no longer be 'undisturbed'. Ego must have some reaction to the frustration which alter has imposed upon, some resentment or hostility....In so far as this happens of course ego is put in an emotional conflict in his relation to alter....ego may develop an ambivalent attitude structure, at the same time adhering to the normative pattern and resenting the 'cost' of this adherence in that it involves him in conflict with alter and with aspects of his own personality [Parsons, 1951, p. 253].

The more common method of dealing with this ambivalence involves the repression of one side of the conflicting need-structure. If the negative reactions to the deviant are repressed, the attachment of the other members of the social unit for him will be maintained. If the positive reactions are repressed, the deviant may be excluded from the unit.

In the case of the severely retarded child in the family, emphasis on positive reactions to the child may cause the parents to keep him at home as an integral part of the family unit. Emphasis on the negative reactions to his deviance may lead to his being placed in an institution. In either case, the repressed feelings continue to exist and must be defended against. Thus, the parents who are determined to keep their retarded child in the family still possess feelings of estrangement toward him which they guard against expressing (Parsons, 1951).

This prediction, based on Parsons' theory of social systems, is supported by data on responses of families to their severely retarded child (Farber & Ryckman, 1965). In high socioeconomic status families, the handicapped child appears to prevent the achievement of goals and plans of the parents and is the object of hostility. However, these parents also feel a strong obligation to care for the child. This conflict is generally resolved by the repression of the negative feelings since the impulsive expression of aggression is generally a low priority need in such higher status families. Thus, parental and familial responsibilities toward the child tend to be emphasized and perhaps strengthened by a "reaction-formation" response due to guilt resulting from negative feelings toward the child (Parsons, 1951; Farber & Ryckman, 1965).

For parents who emphasize their positive reactions and responsibilities toward their retarded child, the continued strain of dealing with a deviant member within the family group may be considered in terms of the response to the "sick role" described by Parsons and Fox (1952). There is, however, an important discrepancy between an individual who is ill in the sense discussed by Parsons and Fox and the severely retarded child in that it is not to be expected that the retarded individual is able to "get well" (Farber & Ryckman, 1965). However, it is generally accepted that the severely retarded can make considerable progress toward semi-independence in self-care skills when provided the assistance of proper programming and parental support (Watson & Lawson, 1966). Thus, although the child will not "recover" from severe mental retardation, his dependency needs can realistically be expected to decrease.

There is inherent in the "sick role," however, a conditional legitimization of dependency and "incapacity" on the part of the sick individual. That is, those who care for the sick are under an obligation to accept the person in his state of illness. When this acceptance is combined with the normally supportive aspects of family roles, the illness may be doubly reinforced. In addition, the other family members may defend against negative feelings toward the sick person by overreacting to his passive dependence--being too sympathetic and supportive and not emphasizing the disciplinary or socializing aspects of their roles, causing him to regress or remain at a childlike level (Parsons & Fox, 1952). In the family with a retarded child, such tendencies would lead to continued infantilization of the child and to great reductions in

the pressures on the child to assume more mature social roles. Farber (1959) sees this as resulting in the arrest of the normal family cycle in that the role of the parents with respect to the severely retarded child is fairly constant. They do not see his status as changing; hence they do not revise their expectations, obligations, and values in ways that exert pressure on him to assume a more independent role.

Examples of the effects of the adults' low expectations for the severely retarded child's functioning ability on the way in which they interact with him are reported by Siegel (1963a, 1963b), Siegel and Harkins (1963), Siegel and Donovan (1964), and Spradlin and Rosenberg (1964). These studies of the verbal interactions between adults and institutionalized mentally retarded children showed that adults tended to simplify their verbal behavior with children whom they were led to believe were retarded. Having defined the handicapped child as incompetent, the adult then reduced the complexity of his interaction with the child.

The importance of the mother's linguistic interaction with her child is also in her provision of a corpus from which he can acquire the language of the community in which he lives (Fodor, 1967; McNeill, 1967). The child's acquisition of language is one of his most important attainments. With the help of language he can organize reality--forming and manipulating concepts by means of logical rules, restructuring his perceptual world, and achieving logical consistency. He can communicate these concepts to others and receive information about the way they have categorized experience. Without this ability to perceive and resolve the mismatch of linguistic implication with perceptual experience, the child will never

proceed beyond enactive and iconic modes of representing and organizing the world (Bruner, 1967).

Not all mothers use language in a way that provides cognitive support for the child. Bernstein (1961) contends that there are social-class-linked differences in habitual modes of speech which result from different ways of structuring and responding to experience and result in different salient dimensions of experience. Restricted codes emphasize social relations and most often serve a supportive function, as in families and friendship groups (Ervin-Tripp, 1966). They are generally concrete, rich in expressive aspects of language, and syntactically redundant, making use of fewer of the optional constructions of the language. Elaborated codes allow specification of meaning and clarification of the options within a situation, as in teaching or in discussion of specific topics between strangers (Cazden, 1966). Such codes use more of the optional structures within the language, resulting in more complex and varied, less redundant forms (Ervin-Tripp, 1966). Bernstein's work has led him to conclude that lower-class individuals learn only the restricted linguistic code while socially higher class individuals have both the restricted and elaborated codes available for communication (Bernstein, 1961).

According to Hess and Shipman (1965b), lower class mothers provide restricted teaching codes in which nonverbal cues most often mediate behavior. Attention is directed to the status of the participants rather than to the specific characteristics of the situation and the possible alternatives for thought and action. Problem-solving ability in the children taught by these mothers was below that of middle-class children

whose mothers drew attention to the demands of the task and pointed out alternative courses of action and the consequences to be expected. Other differences between lower and middle class families (e.g. adequacy of nutrition, availability and adequacy of health-care) covary with differences in language styles and likely strongly affect problem-solving ability also. Nevertheless, when the linguistic environment of the child is filled with lexical options and choice points, he can learn to use language to categorize and integrate his experience. The lower-class child presumably does not learn to encode the complexities of his experience verbally because he functions in an environment where language serves a social-emotional communication role rather than being an informative, rationally based medium (Bernstein, 1961; Hess & Shipman, 1965a).

Like the lower-class child, the pathologically handicapped child often functions in a linguistically and experientially restricted environment. Parents often tend to be overprotective of the handicapped child, preventing him from developing his own skills and capabilities (Farber & Ryckman, 1965). Having defined the handicapped child as "sick" and, therefore, incompetent, the adult then limits the complexity of his interaction with the child. However, too extreme simplification of the language which the child hears may be as damaging as too complex an environment--depriving the child of the necessity or the opportunity to develop more mature modes of expression (Siegel & Harkins, 1963; Spradlin & Rosenberg, 1964).

There have been few attempts to observe interactions of parents and handicapped children, although the need for such research was stressed by Guskin (1963). The problems inherent in this type of research have likely contributed to its scarcity in the literature. Great expenditures of time and effort have been required in the tedious coding process by which data

is gathered and in the processing of the large body of information which interaction analysis techniques generate. Additionally, strategies for analyzing this data to provide evidence of behavioral patterns characteristic of individuals or groups of subjects have been lacking. The two-stage chains generated by the Interaction Analysis Matrix approach identified primarily with Flanders (1970) are not sufficient for this purpose, and available inferential techniques (χ^2) are meaningless in the face of the great numbers of observations (tallies) involved.

In one of a series of studies testing a newly-developed observational and analytic system, Kogan, Winberger, and Bobbitt (1969) compared the interaction of mothers and retarded children (CA range 3-7 years, IQ range 29-70, $N=6$ dyads) with that of mothers and nonretarded children (CA range 4-5 years, IQ unspecified but high, $N=10$ dyads). Of primary interest to these researchers were ratings of the observed interactions along three dimensions: status (dominance-submission), affection (hostility-warmth) and involvement (detachment-involvement). In addition, however, the "interactive function"--i.e. the specific content and form of the message--was recorded. The coding system for these interactive functions was not specified, although the authors stated that 37 such behaviors had been identified from previous work. Results indicated that mothers interacting with retarded children showed more extreme degrees of warmth, less frequent low status (i.e. submissive) behavior, and more hostility accompanying that low status behavior which did occur. Reciprocal status patterns of mother-retardate dyads tended to be in extremes--one member dominant, one submissive--whereas mother-nonretardate dyads showed more non-extreme, egalitarian behavior. In addition, mothers and retarded children showed a characteristic pattern of neutral behavior

in which both were "doing nothing," while mothers and nonretarded children alternated neutral behaviors by taking turns. The most frequent interactive patterns shown by mothers with the retarded children were asking questions to which they supplied or knew the answer and giving orders. In contrast, mothers with the nonretarded children most frequently acknowledged the child's behavior and stated their own ideas. Retarded children had a high occurrence of unintelligible speech; of the speech that was comprehensible, the most frequent utterances were brief, factual answers and low-status comments of compliance, parroting of the mother's words, and requests for information. Nonretarded children showed much more low-status behavior of a widely varied nature, including tentative expression of ideas, questions and requests for help.

In another investigation of differences in the interaction of 20 nonretarded mother-nonretarded child dyads (CA range 3-5 years) and 20 nonretarded mother-retarded child dyads matched to the first group on chronological age (IQ range 13-67), Marshall, Hegrenes, and Goldstein (1973) utilized Skinner's four classifications of verbal operants (tact: labelling, describing; mand: command, question; intraverbal: discussion related to stimuli; and echoic: repetition of response made by other) to categorize recordings of verbal behaviors (Skinner, 1957). Mothers of retarded children and mothers of nonretarded children showed identical patterns of usage of verbal operants, but the frequency of mands was much higher for mothers of retarded children than for mothers of nonretarded children. Additionally, although the usage patterns were similar for retarded and nonretarded children, the retarded children used echoics with greater absolute and relative frequency than did nonretarded children.

These findings appear to be in close agreement with those of Kogan, Wimberger, and Bobbitt (1969). That is, Kogan et al. found less frequent low-status (i.e. subordinate) behavior by mothers interacting with retarded children, and Marshall et al. found more behavior oriented to external control of the situation used by mothers with retarded children. The greater use of echoics by retarded children (Marshall et al., 1973) is also congruent with the greater frequency of utterances including parroting of the mothers' words found in the Kogan et al. study (1969).

Shere and Kastenbaum (1966) completed a study of maternal interaction styles with cerebral palsied children. Results indicated that the mothers tended to define their child's problem very narrowly and to deal only with this one aspect of the child's life. The physical and experiential environment in which the child functioned was barren and passivity was encouraged. In general, the child was perceived more in terms of what he did not do than in terms of what he might be able to accomplish now or in the future. A guidance program of lessons and practice designed to change the behavior of these mothers toward their cerebral palsied children and to teach them how to provide a maximally stimulating environment revealed that, in many cases, this pattern of nonbehavior toward the child was very difficult to change.

The Problem

Evidence has been presented that mothers of severely and moderately impaired children may greatly restrict the environmental stimulation available to their children, focusing on the disability of the child and his inability to cope with the demands made on a normal individual (Parsons & Fox, 1952; Shere & Kastenbaum, 1966). These investigators did not

deal with mentally retarded children or with the nature of the verbal interaction between mother and child. Other researchers, however, have observed maladaptive interaction patterns characterized by extremes of expressed affect, maternal dominance, and conflict rather than coordination of effort in dyads of mothers and retarded children. Efforts at communication within these dyads were rather primitive and did little more than emphasize the dominant maternal and submissive child roles (Kogan, Wimberger, & Robbitt, 1969). Still other evidence indicates that adults tend to simplify their verbal behavior with a child whom they do not know when they perceive him to be mentally retarded (Siegel, 1963a, 1963b; Siegel & Harkins, 1963; Siegel & Donovan, 1964; Spradlin & Rosenberg, 1964).

Restriction of the complexity of the language which the child hears results in his exposure to less adequate models from which to learn the structural principles of the language (Bandura & Harris, 1966; Fodor, 1967; Semmel & Dolley, 1971). Extensive use of nonverbal communication may reduce the salience of language as a secondary reinforcer (Mowrer, 1958) and as a mediator of behavior (Luria, 1961, 1963). Failure of the retarded child to develop linguistic competence may then lead to fixation of cognitive processes at lower levels, because language is not available to organize and direct thought and allow discovery of more abstract concepts (Bruner, 1967; Vygotsky, 1966). Piaget's assertion that "the origin of logical operations is both deeper than and genetically prior to language [1970, p. 722]" lessens the role of language as a necessary and prior condition for development of symbolic processes but does not eliminate it as an important tool for later cognitive processes.

It seems plausible to assert that mothers of trainable mentally retarded children react to their children in terms of their presumed defects

rather than in terms of capabilities which may be developed (Parsons & Fox, 1952; Farber & Ryckman, 1965). They may provide a simpler, less demanding, and less stimulating linguistic and cognitive teacher-learner environment than their children require for the most effective learning. Retarded children whose mothers use such a "restricted code" should show particularly limited problem-solving ability and more primitive language development such as that seen in lower-class "culturally deprived" children (Bernstein, 1961; Hess & Shipman, 1965b). The Kogan, Wimberger, and Bobbitt (1969) study of mothers and retarded children focused primarily on affective components of interaction and provided little evidence regarding cognitive components of the dyadic interaction of mothers and retarded children. Yet it is the cognitive dimension of behavior which appears to be most important in the child's primary learning situation--his interaction with his mother.

Marshall, Hegrenes, and Goldstein (1973) came closer to examining this cognitive dimension when they analyzed the interaction of mother-child dyads in terms of verbal operants produced. However, they did not manipulate the requirements of the interaction situation to determine concomitant changes, if any, in verbal behavior patterns, nor did they examine the effect of the mother's perception of her child as retarded on her interaction with him. That is, they did not attempt to eliminate real differences in the child's ability and, therefore, in the nature of the mother's necessary role in relation to her child by matching the retarded and nonretarded children on some measure of functioning, nor did they attempt to control for differences between mothers in interaction style by observing changes in each mother's verbal behavior as a function of whether she was interacting with her retarded child or with her nonretarded child.

The present study investigates the interaction of middle-class mothers with their trainable mentally retarded¹ and nonretarded children. A comparison group was used which consisted of middle-class mothers interacting with two of their nonretarded children whose chronological ages or levels of social competence were equivalent to those of the retarded children. This interaction was observed under the following conditions: (1) structured situations in which the mother was teaching or directing the child's behavior in tasks requiring motivation, control, and/or verbal structuring of relevant stimulus dimensions; (2) a structured situation in which the child was teaching the mother. It was predicted that middle-class mothers use more restricted, primitive interaction patterns with their trainable retarded child than with their older or younger nonretarded child. It was also predicted that middle-class mothers maintain their interaction with retarded children at more restricted, primitive levels than do middle-class mothers with nonretarded children of the same chronological age or level of social competence.

Recent recommendations to federal and state governmental agencies have favored maintaining the trainable retarded at home and within the community rather than in an institution (President's Panel on Mental Retardation, 1962). However, public school and community-based programs for the trainable retarded are not available to most families of such

¹ For the purpose of this study a trainable mentally retarded child is one whose tested IQ is in the range between 30 and 50. Such a child will typically be unable "to learn elementary school subjects, but [is] able to learn how to take care of daily life activities, such as feeding and clothing himself, mobility, communication, and a few of the more practical social conventions [Koch & Dobson, 1971, p. 484]."

children. Those special education programs which do exist have not generally been able to bring about lasting improvements in the capabilities of these moderately retarded children (Hottel & Dunn, 1958; Cain & Levine, 1963). Hence, the role of the mother as a teacher of her child is an important one for the nonretarded child, but the mother may be the primary or the only teacher the retarded child encounters. If her interaction does not stimulate his development, he will not find other resources to make up the loss.

The hypotheses of the present study have been derived from the theory and empirical evidence of social psychology, cognitive psychology, psycholinguistics, and research findings from the field of mental retardation. If supported, they could provide the basis for programs to improve mother-child teaching strategies.

Coordinate with the interest in identifying patterns of interaction used by middle-class mothers with their trainable retarded children is an interest in the methodological problems of this research area. Data coding and preliminary analysis of results of this study used all but the feedback elements from the cybernetic analysis and feedback system, CATTs (Computer-Assisted Teacher Training System), developed by Semmel (1968), thus eliminating much of the inefficiency and tedium of traditional observational research strategies. Analysis of the interaction data made use of a new strategy proposed by Collet and Semmel (1970) which permits the identification of sequential regularities beyond the simple two-stage processes of past research.

In summary, two purposes are served by the present study. (1) Substantively, the study was designed to evaluate a series of hypotheses

concerning differences in the nature of verbal and nonverbal interaction patterns used within dyads of middle-class mothers and trainable mentally retarded children and within dyads of middle-class mothers and nonretarded children. (2) Methodologically, the study was designed to demonstrate and evaluate the effectiveness of a computer-based system (CATTS) for the coding of observational data and of an analysis strategy permitting the identification of sequential regularities (chains) in behavior.

The following chapter reviews research evidence from the literature which bears on the problems pursued through the present investigation.

CHAPTER II

REVIEW OF THE LITERATURE

The present research has as its dual purposes (a) the testing of hypotheses about differences in the behavioral patterns observed in dyadic interactions of middle-class mothers and trainable mentally retarded children when compared with interactions of middle-class mothers and their nonretarded children and (b) the evaluation of a computer-based coding and analysis system permitting the discovery of sequential regularities in interactive behavior. In keeping with the substantive and methodological foci of the study, this chapter reviews the literature relative to (a) cognitive characteristics of trainable mentally retarded children, and parental attitudes toward the retarded child, and (b) methodological strengths and weaknesses of recent parent-child observational studies.

Cognitive Characteristics of Trainable Mentally Retarded Children

Any attempt to evaluate the techniques by which mothers seek to teach their mentally retarded children must consider the unique requirements of this task. In this section, research on the learning and cognitive characteristics of the trainable mentally retarded is reviewed.

There are relatively few studies of the cognitive development and learning characteristics of the noninstitutionalized moderately retarded. For this reason, although studies using noninstitutionalized trainable retarded subjects are given the greatest weight in this review, findings

with institutionalized trainable retarded subjects which have been demonstrated repeatedly and which appear likely to be unaffected by factors associated with institutionalization have also been included.

General theory. Some attempts have been made to characterize the functioning of the moderately and severely retarded within the framework of Piaget's general theory of cognitive development.

In a study designed to assess the applicability of the six substages of sensorimotor development to the description of the behavior of the severely and profoundly retarded, Woodward (1959) utilized a set of problems requiring skills relevant to each of the substages. All but 6 of the 147 children tested showed a consistency of stage for a variety of behaviors presented to the extent that (a) all behaviors were at the same substage or (b) manipulations were at a lower stage than problem solving.

The development of number concepts by retarded children was explored in similar studies (Mannix, 1960; Woodward, 1961; Hood, 1962). A summary of these studies by Kessler (1970) reported that "Although the mental age at which children entered the stage of concrete operations varied, no child with a mental age of less than six years performed at the level of concrete operations in all the tests, and no child with a mental age of more than six and a half years was at the preoperational stage in all the tests [p. 126-127]." Several Piagetian researchers have speculated on the implications of these findings for the diagnosis and education of the mentally retarded.

Inhelder (1968) proposed that mentally retarded individuals could be characterized by the final stage of cognitive functioning attained. Thus, the severely and profoundly retarded would be those who had attained the sensorimotor stage, the moderately retarded would stop at preconceptual or intuitive levels, and the mildly retarded would be at the stage of concrete operations when development ended. In view of the obvious difficulties in predicting the end point in the development of a retarded child, Inhelder's recommendations were aimed at diagnosis of current functioning levels and behavior characteristics of the older retardate rather than at prediction of the future attainment of young retarded children.

Woodward (1963) discussed the possibility of intra-subject behavior analysis in which a given behavior could be characterized as normal or abnormal in terms of its correspondence or lack of correspondence with the stage of the majority of the individual's functioning. Since it had been found in her previous research (Woodward, 1959) that behavior disturbances in the severely and profoundly retarded were significantly more common when there were discrepancies in the stage of behavior attained for different skill areas than when all areas of functioning were at the same substage, this suggestion for a within-subject measure would seem to have practical utility. The implications for education of a behavior profile with areas of discrepancy would depend on whether this variance was found to be the cause or effect of the behavior disturbance.

Interest in more specific parameters of retardate functioning has resulted in indications that the direction of attention, attention span, verbal control of behavior, and memory are all-important to the under-

standing of learning in the trainable retarded.

Attention. The work which has been identified with Zeaman and House has led to the conclusion that the discrimination learning of the severely retarded is primarily disturbed by difficulty in directing attention to the relevant aspects of the stimulus situation (Zeaman & House, 1963; Zeaman, 1965). Among the major findings from a number of studies with institutionalized, moderately mentally retarded children (MA range: 2-6) as summarized by Zeaman (1965) are the following: (1) discrimination learning of the moderately retarded is mediated by attention, not verbal behavior; (2) poor discrimination can be reversed by directing the individual's attention, which is easier than trying to teach labels for stimuli; (3) attention initially focuses on broad stimulus classes rather than on specific cues; (4) the mentally retarded have a strong position preference and a low initial probability of attending to form or color; (5) the nature of the stimuli used is very important to discrimination learning, including aspects such as novelty, absolute size and figure-ground relationships, number of variable irrelevant dimensions, and dimensionality of stimuli (i.e. 2 vs. 3-dimensional); (6) while the stimulus characteristics and schedule of reinforcement are important determinants of learning, the amount or value of the reinforcer is not important; (7) learning and extinction, once begun, are not different for individuals of different IQ levels and appear to represent one-trial learning; (8) long-term memory is good when discriminations are learned to a strong criterion; (9) although no evidence has been found for the operation of learning sets, there is strong evidence that failure sets influence the performance of

retardates. Specific research findings suggest that intelligence is related to the number of trials required before performance first deviates from chance levels but is not related to the speed with which discrimination performance reaches criterion once learning has begun. The length of the initial chance performance plateaus in the backward learning curves used by Zeaman and House have been attributed to inattention to the relevant aspects of the stimulus situation (Zeaman, 1965). Hagen and Huntsman (1971) have pointed out that the applicability of these findings to more complex learning and to subjects of higher MA levels has yet to be demonstrated. Exclusive use of institutionalized subjects by House, Zeaman, and their colleagues has made it difficult to generalize from their results to the behavior of the noninstitutionalized retarded.

A recent investigation of the effect on discrimination learning of varying the number of relevant stimulus dimensions did use noninstitutionalized retarded children as subjects (Ullman & Routh, 1971). Performance of these children was found to be similar to that of the institutionalized moderately retarded subjects used in previous studies. However, failure to find an interaction between IQ and performance under varying numbers of relevant dimensions suggests that the difficulty of the retarded child in attending to the relevant dimensions of a situation is one related to the level of mental or cognitive development of the child (a low-MA effect) and is not unique to the retarded, i.e., is not a low-IQ effect (Ellis, 1963).

Wunderlich (1971), also using noninstitutionalized retarded subjects ($\bar{X}_{IQ} = 66$), investigated the effectiveness of two procedures for increasing the proficiency of the learning of color discriminations by retardates.

In the first of these procedures (titration), the spatial separation of stimulus and response was gradually increased from 0 to a maximum of 18 inches as the subjects responded correctly to the more contiguous arrangements. The second techniques (double responding) required that the child touch the stimulus color before making the color choice response. The author interpreted the improvement in learning under these conditions as consonant with attentional theory if one assumes that both titration and double responding serve to focus the attention of the child on the task.

The only study reported by Zeaman and House (1963) that showed a difference in the discrimination learning of normals and retardates of equal MA (House & Zeaman, 1958) is open to alternative interpretations of the results. It has been suggested that the social deprivation associated with institutionalization may have resulted in greater distraction for institutionalized subjects under the experimental conditions, thus causing them to require a greater number of trials to discover the rewarded stimulus values (Hagen & Huntsman, 1971; Harter, Brown, & Zigler, 1971).

Although Zeaman expresses the opinion that attentional problems may be remediated through the use of shaping techniques and transfer operations within intradimensional shifts, the failure of these researchers to find evidence of the development of learning sets in the performance of the moderately retarded would seem to indicate that such a training program might have little effect on the overall functioning patterns of the retarded individual (Zeaman, 1965).

In a study carried out by Santostefano and Stayton (1967), mothers attempted to increase the span and focus of attention of their preschool-

age trainable retarded children through a four-month training program. Training procedures required color-form discriminations of increasing complexity using materials which involved an active motor response from the child. Mothers were encouraged to use nonverbal means to communicate the tasks to their children although accompanying verbalization was not discouraged. Pretest and posttest assessment of children participating in the training program (experimental group) and children from similar backgrounds having no contact with the project except for pretest and posttest evaluation (control group--matched to the experimental group in the mean and range of chronological age) was accomplished by the following tests: (1) Maze-Trail test; (2) Picture Discrimination (adapted from the picture vocabulary test of the Stanford-Binet, Form M; (3) Buttons Test (requiring sorting into specified containers); (4) Object Sort Test (grouping by shape or color); (5) Arm Movement Imitation Test. Results indicated statistically significant superiority of the experimental over the control group in pretest-posttest gain on all but the Arm Movement Imitation Test. Although the authors reported that the experimental and control groups were not significantly different on the pretests, the analysis procedures used were inappropriate to this decision. Measures of "plasticity" or ability to profit from coaching also showed superior performance by subjects who had participated in the training program. The authors interpreted their results as indicating that (1) deficiencies in focal attention may restrict the extent to which mentally retarded children are able to benefit from programs adapted from those developed for use with nonretarded nursery-school age children and (2) training by the mother in the focus and directed deployment of attention is feasible

and might result in an increased ability of the young trainable retarded child to benefit from instruction and to select from available stimuli purposefully and spontaneously.

Verbal mediation. Unlike Zeaman and House (1963; Zeaman, 1965), who stress the primary importance of attentional over verbal processes in the discrimination learning of the moderately and severely retarded, another group of researchers characterize the difficulty with verbal mediation of behavior as the basic problem. The major early work on this topic was done by Luria and his colleagues in the Soviet Union (Luria, 1961, 1963). In the basic paradigm for these studies, the experimenter asked the child to press a balloon when a light went on. More complex procedures required that the child press the balloon when a red light was present and refrain from pressing when a green signal was seen. These abilities were found to develop with increasing CA in the normal child, the first task being within the capabilities of a 3 to 3½-year-old child and the second task able to be performed at about 5 to 5½ years of age when the verbal system or second signalling system has begun to control behavior (Luria, 1963).

Linguistic capabilities develop more slowly in the moderately retarded than in the nonretarded, however (Lenneberg, Nichols, & Rosenberger, 1964), and language does not appear to develop in the retarded to the extent necessary to orient and regulate motor behavior. A study of the ability of Down's syndrome children to comprehend and imitate sentences with varying levels of transformational complexity indicated difficulties in processing sentences containing optional transformations (Sammel & Dolley, 1971). The semantic content of simple declarative sentences was

comprehended by most of the children, who were also able to imitate these strings. More complex sentences containing negative, passive or negative-passive markers were not comprehended or imitated well by these children, perhaps reflecting the trainable retarded child's impairment in the ability to manipulate symbols. Such an impairment could exist as a direct result of the factors responsible for his intellectual handicap or could reflect the tendency of those around the child to produce syntactically and semantically simple utterances in deference to his perceived handicap.

Specifically, Luria attributes the difficulties of the mentally retarded child to "pathological inertia of once established verbal connections and the simultaneously arising pathological dissociation of the two signaling systems [which] leads to the gravest defects in their mental processes and determines the extreme difficulties with which their training is connected [Luria, 1963, p. 383]."

Despite his extensive research within the general Lurian framework, including studies using trainable retarded subjects (1968a,b), Milgram has taken issue with Luria's attribution of voluntary activity--including cognitive activity--to the association and integration of the motor and verbal systems and with his equation of all symbolic activity with the verbal system (Milgram, 1971). Instead, Milgram has stated the hypothesis of a verbal mediational deficiency in the following, more general terms: "retarded individuals exhibit a deficiency when working cognitively in the verbal medium; a deficiency above and beyond the performance level dictated by their general cognitive level [1971, p. 34]."

In a critique of Luria's theory and the research which has derived from it, Zigler and Balla (1971) concluded that sufficient negative and

inconsistent experimental evidence exists to suggest the need for caution in the use of this theory in applied settings. Its value as a stimulus to developmental research and the continual discovery of supporting evidence argue against discarding the theory altogether, however. Additionally, they suggested that alternative interpretations of empirical findings--including motivational factors--be considered in explaining differences in the performance of retarded and nonretarded children of equivalent mental age.

Memory processes. In the area of research on memory processes in the mentally retarded, results generally appear to indicate a short-term memory deficit in the retarded that is a function of MA and IQ, while long-term memory appears the same in the retarded and nonretarded (Kessler, 1970). These findings are congruent with those of House and Zeaman that the retardate's primary difficulty was in the initial acquisition of the required discrimination, and learning, once begun, occurred as rapidly in retarded as in nonretarded children (Zeaman & House, 1963).

The generalization on long-term memory is based on the only one of the twelve available studies of long-term memory in the retarded reviewed by Belmont (1966) which was found to be free of serious methodological defects. This study, by Klausmeir, Feldhusen, and Check (1959), used educable mentally retarded, average, and gifted children as subjects. The only study using young moderately retarded subjects (O'Connor & Hermelin, 1963) reported no differences in long-term memory between retarded and nonretarded children when stimulus intensities and number of presentations of lists were varied. Belmont's analysis of the methods employed indicated several areas of possible retardate-normal differences

which were not revealed by the authors' analysis strategy. "...the normals' tendency to reminiscence, and the retardates tendency to forget over retention intervals...are clearly present under both 10 and 20 presentations in the 90-db. group, yet they are absent in both frequency conditions under 55-db. intensity. The repeated measurements may well have differentially affected successive test performances in normals and retardates.... Also, with so few items [six pairs], a floor effect may have been operating [Belmont, 1966, p. 243]."

Evidence from short-term memory studies using mentally retarded subjects appears to be more reliable, although more definitive paradigms have been suggested (Scott & Scott, 1968).

Summary and interpretation. The suggestion that the functioning of the trainable retarded child can be described in terms of Piagetian developmental stages (Woodward, 1959, 1963; Inhelder, 1968; Kessler, 1970) permits the application of diagnostic and educational procedures derived from this theory and emphasizes the importance of dealing with the child at his own cognitive level (e.g. Almy, Chittendon, & Miller, 1967; Elkind, 1970). Thus, characterizing the young child in terms of the cognitive processes and capabilities of the sensorimotor stage leads the teacher to focus on the child's problems with object constancy and his preoccupation with the acquisition of information about his surroundings and cautions the teacher not to expect behavior requiring symbolic processes from him. For a child who has progressed to the preoperational stage--seen by Inhelder (1968) as the final stage likely to be attained by a moderately retarded individual--symbolic behavior is developing but is not yet amenable to manipulation and systematization by the child.

Indications of a lessened ability in moderately retarded children to comprehend or imitate transformationally complex sentences suggest the need for further research to determine the effectiveness of attempts to increase the comprehension and production skills of the trainable retarded (Semmel & Dolley, 1971). The results of such investigations would indicate whether teachers of the trainable retarded should use only simpler structures in communication or whether they should realistically expect and encourage mastery of more complex syntactic and semantic structures.

Faced with evidence of the general inability of the moderately retarded child to control and manipulate his behavior through an internal symbolic system (Luria, 1963; Zeaman, 1965), the teacher of such a child must provide a link between the verbal and motoric systems for him. Thus, verbal instructions cannot be used exclusively in teaching, nor should they be eliminated altogether.

Evidence presented suggests that trainable children have difficulty in directing and maintaining attention to the relevant dimensions and cues in situations requiring the learning of discriminations, which may be seen as the basis of conceptual behavior (Zeaman and House, 1963; Zeaman, 1965). It is not known to what extent this difficulty results from a dissociation of verbal regulation and motor response systems in which the capacity of the individual to control and direct his behavior through symbolic means is impaired (Luria, 1963), and to what extent these phenomena (inattention and inability to use language to orient and regulate motor behavior) are coexistent but independent (Zeaman, 1965).

Interpretation of the results of studies of memory processes in the retarded also supports the hypothesis of an impediment in acquisition processes, although methodological problems in many of these studies suggest that such interpretations must remain tentative. Nevertheless, it appears that the maintenance of information in short-term memory is impaired in the retarded as a function of MA and IQ (Scott & Scott, 1968). Although widely accepted, the generalization that retardates' long-term retention of acquired information is equivalent to that of normals does not appear to have been demonstrated by methodologically sound experimentation (Belmont, 1966).

For a mother or other teacher of a moderately retarded child, the primary concern, it appears, should be the structuring of the learning situation so as to direct the child's attention to the essential aspects of the task at hand and to aid the immediate retention of the learned response. Strategies for accomplishing this might incorporate the suggestions of Zeaman (1965)--e.g. using novel stimuli which provide cues simultaneously in several dimensions, focusing on broad stimulus classes before directing attention to the specific cues within these classes, matching the stimulus characteristics of reinforcers to those of the discriminanda (for example, if teaching the child to stop at a red light, using red candy, tokens, stars, etc. as reinforcers for correct responses would hasten the acquisition of this concept), and manipulating reinforcement schedules so that, during early stages of teaching, every correct response is reinforced while later responding is reinforced on a variable schedule. Maintaining the spatial contiguity of stimulus and response objects during early learning and increasing the separation only

after the subject has responded correctly at lesser intervals and requiring that the child acknowledge the stimulus behaviorally before making the required response may be of benefit in teaching the trainable retarded (Wunderlich, 1971). Whether the facilitation of learning observed in Wunderlich's study would also be found when the relationship of stimulus and response is temporal rather than spatial and verbal rather than tangible is not known, so the generalization of these results to more typical verbal sequential teaching strategies would be of questionable validity in advance of further research.

Hence, a mother wishing to use the most desirable interaction patterns in teaching her trainable mentally retarded child would coordinate verbal and nonverbal communication so that each reinforces and strengthens the meaning of the total message. Through her behavior she would maintain the focus of the child's attention on the relevant dimensions of the situation through verbal cues and through physical cues such as spatial (and perhaps temporal) contiguity of related stimuli. Her communication, while relatively simple in structure, would be highly concrete and specific and would not require extensive use of symbolic processes by the child. Although such strategies would likely benefit all children, they appear particularly necessary as external supports for the retarded child who may not otherwise be able to isolate and respond to the critical elements in his environment.

Having discussed one factor which must be considered in an evaluation of maternal teaching behavior--the special characteristics of the child with whom she is interacting--attention is now directed to a second influential variable--the attitudes of the mother toward the child, including her expectations and perceptions of her retarded child's abilities.

Maternal Attitudes toward Retarded Children

Attitudes are predispositions to actions. Hence, an important factor in the adjustment of any handicapped child is the attitude of his parents--their reaction to the member of the family who has been defined as deviant in some way. There have been several recent comprehensive reviews of the theoretical and empirical discussions of parental reaction to handicap.

Bartel and Guskin (1971) consider handicap to be a socially-defined phenomenon, and they cite the need for additional research to answer specific questions about parental reactions to disability. Differential response to particular kinds of handicap has been suggested, but the nature of these differences has yet to be defined. Differences in parental and professional assessments of particular disabilities have great implications for effective counseling and other professional service programs. Finally, and perhaps most importantly, Bartel and Guskin point out that existing data on parental reactions to exceptional children have been based primarily upon the behavior of those who have been unable to integrate the deviant individual into normal family roles, that is, those who have been referred to social agencies for help in coping with their child. Families who cope successfully with their exceptional child and thus never come to the attention of community service agencies do exist, however. The exceptional members of such families are typically identified upon entrance in school. Attitude structures and coping strategies of such families should be examined and compared with the attitudes and strategies of those having difficulties in adjustment.

Farber and Ryckman (1965) considered research on the impact of the retarded child on family relationships. In this review, Farber's (1964) five-stage model of family crisis resulting from the presence of a retarded member was used to integrate existing research on problems encountered. The family is seen as first attempting to maintain group life as it was and ignoring or minimizing the deviance; next, as feelings of dissatisfaction grow, the child is "defined" as retarded and as the focus of many of the family members' problems; third, as the child is unable to assume sex and age roles appropriate to his chronological age, the normal evolution of family organization is disturbed and must be restructured; extra-family roles and relationships are next to be involved as the family reaches out to outsiders who can help them cope with their difficulties while also reducing other outside activities in order to maintain stress within manageable limits; finally, if all other attempts to maintain the retarded child within the family have failed, the family may seek to eliminate him, typically through institutionalization.

In his later work on the social psychology of mental retardation, Farber (1968) again discussed the impact of the retarded child on the family. In examining the effect of labelling the child as severely retarded, Farber concluded that the extent of redefinition of the child is not the same in all areas of functioning. Ratings of the child's personality tended to be less favorable than those of nonretarded, and social quotients tended to be overestimated in those children whose motor development was relatively normal, although IQ estimates were fairly accurate overall. Moreover, the mother of the noneducable retarded child

appeared to be most influenced by his IQ and behavioral competence as determinants of her response pattern, while the father showed more differential reaction to the sex and external appearance of the child. The effect on siblings appeared to be greatest for those less than ten years older than the retardate and appeared to result from the necessary revision of normal roles so that the retarded child eventually becomes "youngest" and the family structure becomes fixated at a stage incorporating a dependent child.

The effects of the label appear not to be the same for all socioeconomic groups. In the upper socioeconomic strata, the impact of the forced redefinition of hopes and expectations for the retarded child is seen as the primary problem. For families of lower socioeconomic levels, however, there is often less discrepancy between this label of deviance applied to one family member and other labels applied to the family which may mark it as somewhat inadequate and in need of help from social agencies. Farber characterizes the primary problem for such families as involving the actual care of the retarded child.

Changes in response patterns were discussed by Michaels and Schucman (1962) and Schucman (1963), who pointed to the normalcy of an initial period of shock and disbelief experienced by many parents upon learning of the retardation of their child. Such responses and the subsequent use of psychological defense strategies, e.g. denial, projection, to stave off full impact of the shock may be the first steps toward a healthy adjustment to the problems to be faced.

Matheny and Vernick (1969) tested the hypothesis that parental reaction to the knowledge of their child's retardation is more indicative

of inaccurate and insufficient information about the problem than of emotionality and neurotic tendencies. These researchers asked parents to estimate the developmental level (in years and months) of their child, whose retardation was suspected, and to answer a series of questions about their expectations for future achievement by this child. The importance and ultimate availability of this information to the parents was stressed by the interviewing social worker. The same estimates and expectations were also provided by members of the staff of the retardation clinic through which diagnosis of the children was being made. After an interval of approximately one month following counseling of the parents by the clinic pediatrician, a second home interview sought out the parents' expectations for the eventual attainment of their retarded child. Analysis revealed that estimates of developmental age by parents and clinical staff were not significantly different, but significantly greater expectancies for future achievement of the children in question were expressed by parents than by the staff before counseling. Differences in expectations after consultation with the pediatrician were not statistically significant. In conclusion, Matheny and Vernick stated that emotional factors in parent reactions were not so great that perception of their child's behavior was distorted or that new information could not be accepted and acted upon. As parents' expectations came to resemble those of the professionals they were consulting, they tended to follow the recommendations of the staff. Much of the apparently limited acceptance of the retarded child's problems often cited by professionals was seen by these writers as resulting from inaccurate and insufficient information upon which to base appropriate responses.

Wolfensberger (1967) has further questioned the widely-held assumption that parents tend to reject their retarded children and has noted that this assumption has often led to a characterization of all parental responses as pathological and rejecting--a situation in which the parent cannot "win." In citing a need for specification of the meaning of the parental "acceptance" being sought, Wolfensberger also suggests that the importance of acceptance to the parents' behavior in managing their retarded child has not been demonstrated and may have been greatly overstated.

Attempts to modify parental attitudes toward the retarded must take into account not only the changing reaction patterns discussed by Michaels and Schucman (1962; Schucman, 1963) but also more stable family characteristics including the value systems which help to determine treatment goals, role identifications and family interpersonal relationships, and feelings which determine how the retarded child and other family members interact within the family at present (Watts, 1969).

In their study using mothers as trainers of their preschool-age severely retarded children, Santostefano and Stayton (1967) reported that mothers initially felt great stress and experienced difficulty in making specific demands, setting limits and disciplining their retarded child. These problems decreased as the program continued, however, and several mothers expressed surprise at the progress made, suggesting a general tendency for them to underestimate the capabilities of their children.

The differences in the findings of Matheny and Vernick (1969) and Santostefano and Stayton (1967) appear related to differences in the

behaviors selected as indicators of parental attitudes. Thus it may be that while parents of a retarded child are able to describe him in terms which are congruent with professional assessments, their initial expectations for their child's eventual capabilities may be beyond his probable developmental limits and their actual behavior toward the child may reflect their perception of him as handicapped and their unwillingness to make excessive demands of him.

Interpretation of experimental data. There have also been a number of experimental attempts to isolate critical variables in parent attitudes toward retarded children. Comparison of the results of these studies is made difficult, however, by the variety of instruments used to measure parents' attitudes. Among the instruments utilized by researchers are the Parental Attitude Research Instrument (PARI) (Schaefer & Bell, 1958), the Index of Marital Integration (Farber, 1953), the Farber Sibling Role Tension Index (Farber, 1959), and estimates by parents of their child's IQ.

The PARI has received wide use by researchers in the field of retardation. This is a set of 115 items dealing with varied aspects of child rearing to which the respondent indicates his agreement or disagreement on a 4-point scale. In a general discussion of problems and strategies for research on family reactions to handicap, Bell (1964) pointed to several problems with the PARI, suggesting possible alternatives to this inventory. The 115 items have been divided into 23 five-item scales which have not been shown to represent discrete factors. Additionally, the small number of items per scale and the often great similarity of scale items caused Bell to speculate that loadings on these scales measure consistency.

of response to restatements of the same question rather than pervasive attitudes underlying large and varied segments of behavior.

There is also a great problem with response sets on the PARI (Bell, 1964; Silverstein & Dingman, 1965). A response set is a tendency of a respondent to agree or disagree to the same extent on all items, regardless of content. Such a bias is often found in responses to instruments of this type, but in the PARI a response set can greatly alter item-response profiles and cannot be differentiated from the attitude-content being explored. As one solution to the problem, Bell (1962) suggested converting each subject's responses to standard score equivalents using the mean and standard deviation of his own responses. Utilizing this technique to compare PARI scores of mothers of moderately retarded children to scores of mothers of severely retarded children, Silverstein and Dingman (1965) found significant differences on only three of the 23 scales, although comparison of the unconverted scores had indicated significant differences on 15 scales. Since the obtained number of significant differences was not greater than the number expected by chance when a series of statistical tests are carried out, the authors concluded that their data indicated no differences in the PARI scores of their subjects and cautioned against generalizations based on uncorrected PARI scores in other studies.

Analysis of the PARI responses has led to the identification of two orthogonal dimensions along which parental attitudes can be described: autonomy-control and hostility-love. In a study attempting to locate maternal attitudes toward children having different handicaps in terms of these dimensions, Cook (1963) found very little spread along the hostility-love dimension but considerable difference along the autonomy-

control axis, with mothers of the severely handicapped more authoritarian than mothers of the mildly and moderately handicapped and mothers of blind, cerebral palsied, or mongoloid children showing higher scores in the authoritarian direction than mothers of deaf or "organic" children. The author speculated that these results might be related to the degree of deviance perceived or to the visibility of the handicap and the amount of care required. Additionally, he questioned the negative connotations of the labels describing the dimensions and pointed out that the mother of a severely handicapped child may have little opportunity for choice in her child-rearing patterns and the necessity for increased control of the child may also change her attitudes.

In the discussion of the results of his study, Cook also cited three areas of methodological weakness which made interpretation of findings difficult: (a) no control group of mothers not having handicapped children was used; (b) it was not certain that mothers were set to respond in terms of their handicapped child; (c) no control for the effects of an acquiescence set on the PARI responses was utilized. In a later study, Ricci (1970) attempted to solve these problems by comparing the PARI responses of three groups of mothers (mothers of retarded, emotionally disturbed, and nonhandicapped children) under three conditions. On the first administration, each mother was instructed to think in terms of all her children in responding. A week later, mothers were asked to answer the PARI items in terms of the specific child under consideration in the study (the handicapped child for the two "experimental" groups and a child of approximately equivalent CA in the "control" group). A final administration--again presented after an interval of one week--required response

to a set of PARI items restated so that the scales were reversed in order to identify and control for acquiescence sets. Results indicated the most rejecting attitudes (i.e. extreme location in the hostile, autonomous quadrant) in mothers of the retarded and the least rejecting attitudes in mothers in the control group. Although mothers of children in the control group had the most authoritarian scores, it was felt that the lower educational level of this group was a confounding factor since other authors (e.g. Cook, 1963) have found an association of educational attainment and authoritarianism on the PARI.

A somewhat different approach to the measurement of the impact of a mentally retarded child on his family was taken by Fowle (1968). She used the Farber Index of Marital Integration and the Farber Sibling Role Tension Index to compare responses of parents who had kept their severely retarded child at home to responses of parents who had institutionalized their child. No significant difference between the two groups in marital integration was found. A significant difference in marital integration was reported to exist between parents whose children had been institutionalized for less than two years and those whose children had been institutionalized for two years or more, but it appears that a post hoc data analysis technique should have been used in answering this question since the author reports that the hypothesis was suggested by examination of the data (Hays, 1963; Gabriel, 1966). In both groups, the role tension was greater for wives than husbands. It was suggested that differences in these results and those of Farber (1959) (who did find greater problems of marital integration in families keeping their retarded child at home) might be associated with the greater availability and use of day

care services by parents in the later study.

The Parsons-Bales theory of family structure and parental roles provided the basis for the hypothesis by Tallman (1965) that "the existence of a severely retarded child in the family tends to highlight the parental role differences which are extant in the American family [p. 37]." Utilizing an interview presentation of problems in parent-retarded child relationships, elicited parental responses were rated on dimensions of flexibility, empathy, and motivation; the sum of the mean scores on the three dimensions provided a score on parent adaptability. Judgments of the retarded child's social competence were made by the parents using the Cain-Levine Social Competency Scale. Progress was assessed by comparing two administrations of this scale separated by an interval of one year. Specific predictions of the study were the following: severely retarded sons would be seen as more deviant than severely retarded daughters because the instrumental skills expected of sons are not likely to be acquired, while the nurturance, obedience, and responsibility expected of girls are likely to be skills developed by severely retarded individuals of both sexes; fathers would be less skillful in coping with severely retarded children, more influenced by visible stigmata that affect the family's image than are mothers, and more frustrated and otherwise affected by severely handicapped sons than daughters. Results indicated overall higher adaptability in the mothers than in the fathers studied. There was a significant correlation of adaptability and growth in the social competence of the severely mentally retarded child for mothers but not for fathers. In keeping with the hypothesis about the greater vulnerability of fathers to the social stigma associated with

more visible forms of retardation, fathers of nonmongoloids showed greater adaptability than did fathers of mongoloids; no significant association of adaptability and etiology or of adaptability and sex of the child was found for mothers in the study. A differential reaction of fathers according to the sex of the child was found in which involvement with daughters was limited and routine while involvement with severely retarded sons was either very great or negligible. Overall, Tallman saw these results as consistent with the Parsons-Bales formulation and providing support for the applicability of this model to the functioning of families which include a severely retarded child. The crucial questions of whether there were significant differences between mothers and fathers in the association of adaptability scores with the etiology of their child's retardation or with the sex of their retarded child were not examined by Tallman.

In a later study, VanEvery, Semmel, & Sitko (1972) obtained Cain-Levine ratings of trainable mentally retarded pupils from teachers and from each parent. In contrast to Tallman's (1965) findings, parents did not differ significantly in ratings of their retarded child although, as predicted, ratings were higher than those made by teachers. No differential response by any of the fathers to the sex of the child was found, and all raters perceived the same rate of growth in the retarded children under consideration. In discussing these results, the authors suggested that parents' socioemotional roles cause them to be more optimistic about their retarded child than is the teacher and that, since parents and teachers interact with the child within very different environments, their ratings may reflect these differences.

Capobianco and Knox (1964), utilizing Farber's Index of Marital Integration, looked for relationships between marital integration and the accuracy with which parents estimated the IQ of their retarded children. IQ estimates were obtained by asking each parent to indicate which of the questions on Form L of the Stanford-Binet his retarded child could answer. Questions had been rearranged to remove cues provided by the age-grading of the standard form. It was found that mothers' IQ estimates were significantly higher than either fathers' estimates or measured IQ. Fathers' estimates were not significantly greater than measured IQ, nor did marital integration scores correlate significantly with differences between measured and estimated IQ for either mothers or fathers. The authors seemed unable to explain the failure to find an association between accuracy of IQ estimates and marital integration scores as they had expected. They did not indicate the range of integration scores represented within their sample, however, so it could not be determined whether the variability of scores was sufficient to permit statistical significance--a problem often encountered in analysis of test scores in small homogeneous groups (Hays, 1963).

The differences in the accuracy of estimates of IQ by mothers and fathers were interpreted by Capobianco and Knox (1964) to indicate that fathers are more accurate in their observations than are mothers, who are perhaps more optimistic and less realistic in their observations. It is also possible, however, that if fathers do see less of their retarded children as has been claimed (Capobianco & Knox, 1964; Farber, 1968), they may respond to the more public, obvious facets of the behavior of these children--the same subset of the total behavior pattern that is

sampled by IQ tests. Mothers of these children, however, may be responding to more subtle evidence of growth and ability observed in their closer association with the child, which is not tapped by existing IQ tests.

Other studies have utilized IQ estimates to measure parental perception of and attitudes toward their retarded children (Gorelick & Sandhu, 1967; Heriot & Schmickel, 1967). In the Heriot and Schmickel study, mothers were asked how old their retarded child acted on the average (excluding the effects of specific handicaps which might further limit behavior in some areas). From these estimates of MA, IQs were calculated and compared with measured IQ and Vineland Social Quotients (SQ). It was found that, although the correlation of estimated and measured IQ was significant, estimated IQ was significantly greater than measured IQ. No significant differences between estimated IQ and measured SQ were found, but this is not unexpected since it was presumably the mother who provided the information for the Vineland. This result does perhaps lend additional support to the hypothesis that mothers are responding to behaviors other than those measured on individual intelligence tests when they characterize the functioning level of their retarded child. In addition, it was found that the accuracy of maternal estimates of IQ was greater for children with lower measured IQs than for those scoring at more nearly normal levels, perhaps again indicating that mothers rely on cues of social behavior, which are more likely to be discrepant from the child's abstract verbal skills in the mild and borderline retarded range than at levels of severe retardation where all behavior is greatly impaired.

A third study using maternal estimates of IQ was conducted by Gorelick and Sandhu (1967) who criticized other investigators for obtaining estimated

and measured IQs on different instruments or through nonparallel procedures. Their solution to this problem was to test the mother and retarded child simultaneously but separately on the same instrument (Stanford-Binet or Cattell), instructing the mother to respond to each item as she felt her child would respond. A significant difference in the two sets of scores was found, with 17 of the study's 25 mothers overestimating their child's IQ by 1 to 66 points and 6 mothers underestimating by 1 to 29 points. The authors commented that the obtained differences ($\bar{D} = +6.92$ points) were not so great as they had expected, perhaps indicating, in agreement with the findings of Matheny and Vernick (1969), that mothers are aware of the capabilities of their retarded children and do not overgeneralize from the label of retardation in describing their children.

In each of these studies, the authors pointed to the implications of the IQ estimates given by parents for use in counseling and for delineation of differences in perceptions of mothers, fathers, and possibly other family members.

Worchel and Worchel (1961) asked parents from 22 families (39 parents in all) to rate the applicability of each of a series of adjectives to three children: their retarded child, most children, and the ideal child. Nonretarded siblings within these families were also rated by their parents. It was found that the retarded were rated significantly less favorably than their nonretarded siblings and less favorably than other children (although these differences were not significant). In contrast, the nonretarded children of the families studied were rated significantly more favorably than the parents' ratings of "most" children. Greater variability in attitudes toward the retarded ($sd = 25.00$) than toward other

groups involved ($\underline{sd}_{\text{normal}} = 20.20$, $\underline{sd}_{\text{ideal}} = 15.30$, $\underline{sd}_{\text{other}} = 13.80$) was also evident in the discrepancy scores between ratings of the retarded child and those of the ideal child ($\bar{D} = 74.50$, $\underline{sd} = 26.20$) and of other children ($\bar{D} = 8.32$, $\underline{sd} = 24.40$) (Normal-Ideal: $\bar{D} = 43.20$, $\underline{sd} = 20.30$; Normal-Other: $\bar{D} = 23.00$, $\underline{sd} = 18.50$). Some parents, in fact rated their retarded child more favorably overall than they rated "other" children although not more favorably than they rated the ideal child. Worchel and Worchel speculated that such parents might be those with greater ability to accept a retarded child and that they should be studied in greater depth. In addition, fuller interpretation of results would be possible if comparable data were available from parents who do not admit to retardation in a child others have diagnosed as mentally retarded and parents having only nonretarded children.

Using five instruments to measure parent attitudes, Cummings, Bayley and Rie (1966) looked for differential effects on mothers' personalities of different types of deficiency in their children. Mothers of retarded, chronically ill, or neurotic children were tested with an inventory of child-rearing attitudes partially based on the Shoben Parental Attitude Inventory, the Self-Acceptance Scale of the Berger Acceptance Inventory, a sentence completion test constructed by one of the authors, the Family Drawing Task, and the Edwards Personal Preference Schedule. Mothers of the retarded gave more deviant responses than mothers of the chronically ill but appeared less deviant than mothers of neurotic children. A distinctive response pattern emerging in mothers of the retarded indicated depression, preoccupation with the child, possessiveness, low enjoyment of the child, difficulty in handling anger toward him, a perceived lack

of maternal competence, and child-rearing attitudes characterized by rejection. No distinctive patterns for the other two groups were discernible. The authors noted that results indicated probably minimized the effects of these handicaps on maternal personality since only intact families were used and all tests were self-administered at home without an experimenter present.

Summary and analysis. In this section, both the product and the process of research on parental attitudes toward the retarded have been reviewed.

Serious methodological problems exist in this research area (Bell, 1964). One difficulty is the probable unrepresentativeness of the samples employed, which typically do not include family units which have successfully coped with the task of rearing their retarded child to the extent that they do not seek out help from a community service agency (Bartel & Guskin, 1970) or families which have been so greatly damaged by stresses, including those brought about by the presence of the retarded child, that they have disintegrated (Cummings, Bayley, & Rie, 1966).

A second area of concern is the means by which parental attitudes are assessed. The plethora of instruments employed for this purpose makes difficult the comparison of results of different studies.

The widely-used Parental Attitude Research Instrument (PARI) (Schaefer & Bell, 1958) has flaws in its design (Bell, 1962, 1964; Cook, 1963) which several investigators have attempted to bypass or correct (Bell, 1962; Silverstein & Dingman, 1965; Ricci, 1970).

A rather popular technique for assessing parental attitudes toward and perceptions of their retarded child has compared parental estimates

of the child's IQ or some other measure of his functioning with his attained score or with estimates of the same indices by professionals in the field. Results indicate that parental perceptions of the IQ of their retarded children tended to be fairly accurate, although maternal estimates were higher than the obtained IQ in several studies (Capobianco & Knox, 1964; Gorelick & Sandhu, 1967; Heriot & Schmickel, 1967). Capobianco and Knox (1964) suggested that this phenomenon may point up greater optimism and less realism in the maternal perceptions of their retarded child's capabilities; however, it may be the case that mothers are responding to aspects of their children's abilities not tapped by IQ tests (VanEvery, Semmel, & Sitko, 1972). This interpretation is also consistent with findings by Heriot and Schmickel (1967) of significant differences in estimated and measured IQ while differences in estimated IQ and Vineland SQ were not significant.

It appears that one of the generalizations which can be made about parental attitudes toward their retarded children is that these attitudes often change. They change positively as a result of adaptation to the shock and dismay of discovering that one's child is retarded (Michaels & Schucman, 1962; Schucman, 1963) and in response to counseling (Matheny & Vernick, 1969) and education (Santostefano & Stayton, 1967). They become more negative in response to the increasing pressures of maintaining a retarded child in the family (Farber, 1964). The specific change in parental attitudes is a function of socioeconomic group membership (Farber, 1968), family role (Tallman, 1965; Farber, 1968; Fowle, 1968), and the etiology of the retardation (Cook, 1963; Tallman, 1965; Cummings, Bayley, & Rie, 1966). Wolfensberger (1967) has speculated that the assumption

of parental rejection of the retarded child often results in the interpretation of all behavior of these parents as rejecting, and he has questioned whether the poorly defined concept of parental "acceptance" is an important one for predicting and understanding parental behavior in relation to the retarded child.

Thus, indications of stress, trauma and adjustment difficulties, whether the result of increasingly pathological and disruptive pressures within the family (Farber, 1968) or of more short-lived problems of emotional reaction and information-deprivation (Michaels & Schucman, 1962; Schucman, 1963; Matheny & Vernick, 1969), need not imply that the parental perceptions of their retarded children are totally unrealistic. Counseling and education may help, however, to eliminate misconceptions and problems which prevent the development of optimal parent-child interrelationships (Santostefano & Stayton, 1967).

Specific effects of attitudinal factors upon the behavior of parents in interaction with their retarded children have yet to be demonstrated (Guskin, 1963; Wolfensberger, 1967). General hypotheses about the relationship of attitude to behavior were presented in the preceding chapter and will be discussed further in the following two chapters.

In the face of the difficulties with techniques for studying parent-child relationships discussed above, other methods for answering questions about this association have been sought. In the following section, systems which have been developed for the direct study of parent-child interaction are reviewed.

Techniques for Studying Parent-Child Interaction

Interest in describing the actual process of interaction between parent and child has increased in recent years, as evidenced in recent reviews by Freeberg and Payne (1967), Lytton (1971) and Streissguth and Bee (1972). The development of a suitable methodology for this research has presented considerable problems, however, in recording, describing and analyzing behavior. Consideration of the methodological strengths and weaknesses of recent parent-child observational studies is essential since it is against these that the value of the coding and analytic systems of the present study are evaluated.

Some authors, while stating an interest in manipulating parent-child interaction, have still measured only the apparent products of such manipulation. For example, two studies seeking to improve mother-child interaction in lower socioeconomic status families provided instruction in the use of certain toys--designated Verbal Interaction Stimulation Materials--over a period of several months. The effectiveness of this program was measured by the change in verbal intelligence of the children involved; no attempt was made to gather data on the nature or the extent of the changes occurring within the mother-child dyad as a result of this instruction (Levenstein & Sunley, 1968; Levenstein, 1970). Another study with a stated interest in the interaction within the family of a severely subnormal child, albeit an indirect means of gathering data, was reported by Jeffree and Cashdan (1971). These investigators interviewed parents on topics covering a variety of child-rearing practices. They also presented a series of tasks to the retarded children in order to point up areas in which these children were lacking in experiences.

It is not intended that studies of this type should be discussed here in detail. Rather, this section reviews only those studies which have utilized direct observation of behavior (primarily, mother-child interaction) and have formulated hypotheses about this interaction. In particular, limitations in the commonly-used techniques for recording, coding, and analyzing interaction data are discussed.

Recording techniques. One variable to be considered in a discussion of methodological issues in studying parent-child interaction is the manner in which the data are recorded and made ready for analysis. This particular decision by the experimenter controls to a very great extent the analyses which will later be possible and the kinds of experimental questions which may be answered.

In his review of the methodologies of observational research, Lytton (1971) described five procedures which have been used to generate the data for such studies--that is, techniques for translating the raw data of the actual interaction being observed and possibly recorded to a secondary level of "raw data" which can be summarized and manipulated analytically in order to provide evidence for testing the experimental hypotheses. Two of these procedures, not to be discussed further in this review, are post-observation ratings of the interaction in terms of global characteristics and narrative-style summaries of behavior which are constructed after the observations are completed. Studies using the three remaining techniques--narrative descriptions of particular aspects of the interaction situation which are constructed as the behavior is observed, specimen records which attempt to provide a complete

record of the observed behavior in all its aspects, and predetermined categories of behavior--will be considered in greater detail.

Narrative descriptions of observed behavior have been used by a number of investigators in order to preserve and translate nonverbal behavior so that it can then be coordinated with recorded verbal behavior and coded into a summary form.

Hess and Shipman (1965b) and several of their colleagues and students (Olim, Hess, & Shipman, 1967; Brophy, 1969) have utilized a large body of data on the behavior of a group of mothers and preschool-age children which was gathered for the 1965 Study of the Cognitive Environments of Urban Preschool Children. In gathering the data on mother-child interactions in a structured laboratory situation, subjects' verbalizations were tape recorded while an observer viewing the setting through a one-way window simultaneously described the nonverbal behavior onto a second tape in an attempt to preserve the sequence of verbal and nonverbal events as they originally occurred. "Unless self-explanatory, physical movements were described with reference to their purpose of intent. Although the observers were instructed to report any behavior that appeared relevant at any point in time, behaviors falling in certain specific categories were given primary and consistent priority [Hess & Shipman, 1965a, p. 17]."

Greenberg (1971) filmed mother-infant dyads in an unstructured but standardized laboratory situation. Observers then viewed these films repeatedly in order to produce complete narrative descriptions of each sequence.

Coding techniques. In the studies discussed above, narrative and specimen records have been used as a prelude to subsequent coding of the behavior in terms of predetermined categories.

Lytton's (1971) discussion of coding systems has treated all such systems as essentially the same, differing only in the specificity of the categories used and, thus, in the extent to which the detail of the observed behavior is preserved. However, a distinction within the concept of precoded systems which might be helpful in a consideration of methodological issues has been made by those using these systems in educational research (Medley & Mitzel, 1963; Simon & Boyer, 1967). Sign systems establish a set of behavioral acts or incidents prior to observation; the task of the observer is to record which of these incidents occurred and, if desired, the frequency of occurrence of each incident-type. In contrast, a category system provides a finite set of units into which each behavioral element can be classified--that is, it is a mutually exclusive and exhaustive set of coding units (Medley & Mitzel, 1963; Flanders, 1970).

Although the use of more sophisticated aids to observation and coding--mechanical recorders, videotapes, computer-based systems--is increasing, it appears that the majority of recent observational studies are still dependent upon paper-and-pencil coding by an observer present at the original interaction session or utilizing a permanent record of the interaction and/or a narrative summary. In such cases, the distinction between sign and category systems is an important one, since the questions which may be answered by data from each system are somewhat different.

Category systems are particularly useful when observers are coding behavior by some nonmechanical means which does not permit the direct measurement of the duration of a behavior. In this case, coding done at a constant rate and including all of behavior, to the extent that every behavior which does not fall in category X may be placed in some other category Y, will permit one to determine the duration of a behavioral element (Flanders, 1970).

Marshall, Hegrenes, and Goldstein (1973) categorized the verbal behavior of dyads of mothers and children according to a sign system consisting of Skinner's four categories of verbal operants: tacts, mands, echoics, and intraverbals (Skinner, 1957). Only the frequency of each category was recorded.

The body of research which has been based on the sizable body of data gathered by Hess and Shipman and their colleagues (Hess & Shipman, 1965a, 1965b, 1965c, 1967; Olim, Hess, & Shipman, 1967; Brophy, 1969) has utilized a sign system in which the basic observational unit is a message-unit consisting of "an attempt to transmit a single thought or idea from the mother to the child, along with the child's immediate reaction to that transmission [Hess & Shipman, 1965a, p. 19]." As indicated earlier, coding was a two-stage process involving, first, the observer's verbal description of the nonverbal behavior of the mother-child dyads--a "first-stage" coding in terms of a sign system whose units were partially specified--followed by the coding of each message unit from the typescript of the combined and coordinated verbal and nonverbal behaviors in the dyads. Such a system does not, of course,

yield a measure of the time spent in a category unless that time is measured separately.

A time-independent system does not provide an adequate description of behavior sequences, however. By ignoring the duration of recorded behaviors, the predominance of one category over others in the system cannot be determined and, in fact, the entire interaction sequence is distorted by a coding system which gives equal weight to very brief and very prolonged behaviors.

Three recent studies using sign systems also provided a means for ascertaining the approximate duration of each recorded behavior (Bee, 1967; Lewis, 1972; Tulkin & Kagan, 1972).

Bee (1967), looking for correlates to distractibility in nine-year-old children, used a sign system to describe verbalized problem-solving and group decision-making behavior in parent-child groups. From audio tape recordings, the content of verbal interaction in those tasks requiring solution of problems was encoded in thirteen types of parental remarks and four types of child behavior. Decision-making strategies were scored for the frequency with which each member of the group "won" the decision and the extent to which statements of group members "meshed with"--i.e. followed from or responded to--previous statements. Data included the frequency and rate of occurrence per minute of each category.

In the two remaining studies, a chart was used in which each section represented a specific time unit. Although these investigators used different time intervals (five seconds in Tulkin et al. and ten

seconds in Lewis), the basic design was the same--the observer, coding "live," noted the occurrence of any of the pre-selected behaviors within the time period in which it occurred, tallying zero, one, or more than one element in each box.

A refinement of this procedure has been introduced by other researchers who have devised mechanical means for recording the occurrence and duration of the behaviors included within the descriptive system.

Jones and Moss (1971) employed an Esterline-Angus Event Recorder to record the duration and sequence of the 32 maternal and infant behaviors they selected for study.

Greenberg's (1971) procedure required a series of three "stimuli recording boxes" for recording the occurrence and duration of ten maternal and six infant behaviors from the specimen record descriptions. Three observers--one working at each box--signalled the occurrence of a behavioral event by pushing the appropriate button and keeping it in the depressed or "on" position for the duration of the behavior.

These devices might seem, at first, to be little more than gadgetry having, at best, the advantage of making the observers' task a little easier by eliminating the need for a constant rate of coding and speeding up analysis procedures by providing the coded data rapidly and in a form compatible with further computer analysis. In addition to these decided improvements in the precision and efficiency of the data-gathering system, however, are others which are less obvious but perhaps more important. As coding systems increasingly demand the observation of both nonverbal and verbal behavior, the change in the observer's task

from that of writing category numbers or entering tallies on paper to that of pushing a button permits him to devote more attention to the interaction he must describe by requiring almost no visual contact with the coding apparatus. With the task of coding per se made less tiring and time-consuming, the observer is able to utilize more complex observational systems to describe more detailed and subtle aspects of the situation.

As researchers using sign systems have become more ingenious in the design of recording apparatus, the original differences between sign and category systems have been reduced. Use of a sign system no longer implies that the data generated will be a simple count of the number of different behavior types seen or a tally of the frequency of occurrence of each specified behavior. Time grids for paper-and-pencil coding (Bee, 1967; Lewis, 1972; Tulkin & Kagan, 1972) and mechanical recording units which measure the duration of a coding move (Greenberg, 1971; Jones & Moss, 1971) have permitted the determination of the relative amounts of time spent in various behaviors of interest. The transition from such systems to studies using category systems is, then, not so great a leap as it would have been earlier. Category coding simply adds an additional feature to an observational system: categories are mutually exclusive and exhaustive, so that every unit of behavior--however defined--is assigned to one and only one category. Hence, in terms of whatever conceptual dimensions are being examined, the total episode of behavior is described: we are not left with descriptive gaps in the continuity of the interaction observed.

As is the case with sign systems, there is a considerable range of technical refinement in studies using category systems.

Zunich (1971) used a seventeen-category system to describe maternal behavior in interaction with a child in an unstructured laboratory situation. Coding was done "live"--i.e. as the interaction occurred--at five-second intervals and, presumably, by paper-and-pencil techniques, since no specialized apparatus was described.

In a series of studies originating from the University of Washington, a complex and sophisticated system for the coding and analysis of mother-child interaction has been presented (Kogan & Wimberger, 1966, 1969; Bobbitt, Gourevitch, Miller, & Jensen, 1969; Kogan, Wimberger, & Bobbitt, 1969). In this system there were several distinct stages in the encoding of the data. During the initial recording of the interaction sessions, the observer coded nonvocal behavior on one channel of a stereophonic tape recorder according to an empirically-derived system of 43 categories while vocal behavior was recorded simultaneously on the second channel. A second categorization identified the "avenues of communication" used in each transaction--verbal, visual, tactile, manipulative or gestural communication (Kogan & Wimberger, 1966); the third level of coding required the rating of each member of the mother-child dyad on each of three parameters--relative status, affection and involvement--(Kogan & Wimberger, 1969) and the description of the content and form of the communications within each four-second time interval in terms of an empirically-derived system of 37 categories (Kogan, Wimberger, & Bobbitt, 1969).

Of the studies reported thus far which have used category systems in describing behavior, neither made use of mechanical coding aids. Since Kogan and Wimberger (1966) used a tape recorder to record verbal behavior and coded nonverbal behavior "live" by coding each behavior in terms of a preconstructed category system, mechanical devices such as those used by Jones and Moss (1971) and Greenberg (1971) would perhaps have little added value to coders who were not in danger of missing important and irretrievable interaction data through the distraction of manual coding procedures. However, accurate coding using such techniques when complex category systems are involved typically requires several "passes" through the recorded data to insure that all behaviors have been coded. This procedure has the disadvantage of requiring more time and conceivably introducing a bias in which the coder's knowledge of the events following a specific behavior influences the categorization of that action.

A system developed by Semmel and his associates (Semmel, 1968, 1972; Semmel, Olson, & Weiske, 1972) and called CATTS (Computer-Assisted Teacher Training System) may be generalized to permit the researcher to avoid these problems. CATTS was developed as "a closed-loop cybernetic system characterized by immediate feedback of relevant teacher-pupil interaction to the teacher [Semmel, 1968, p. 397]" and consists of three component stations--a teaching station, an observation-coding station and an analysis-encoding station. The feature having the greatest relevance to the problems of observational research discussed here is the direct link between the terminal boxes which are used to code behavior as it is observed and the computer which provides high-speed summary,

analysis and storage of the coded information and can, if desired, integrate coding moves from several observers using different systems into a single record in which the sequence of behavior is preserved. As indicated earlier, the mechanization of the coding process can free an observer from the interference of manual paper-and-pencil techniques and permit greater attentiveness to the interaction being studied. CATTS provides this mechanical advantage and, additionally, permits the simultaneous use of multiple coding systems, each describing different facets of behavior, rather than requiring that such systems be applied in series as was done in the Chicago research (Hess & Shipman, 1965a, 1965b, 1965c, 1967; Olim, Hess, & Shipman, 1967; Brophy, 1969) and the Washington research (Kogan & Wimberger, 1966, 1969; Kogan, Wimberger, & Bobbitt, 1969). Thus, coding may be done "live"--as the interaction occurs--or by a single "pass" through a recording of the interaction, eliminating the likelihood that the coder's knowledge of subsequent events will influence the categorization of a prior behavior. All studies using CATTS have employed category systems, although it would likely be possible to adapt the programs to permit use of sign systems.

Additionally, coding moves in the CATTS are made as the interaction changes rather than at fixed intervals as in other systems. The CATTS procedure eliminates the analysis problems resulting from variation in the size of the coding interval (Collet & Semmel, 1970). That is, in coding systems using fixed intervals, the observer codes the primary behavior occurring during each time period. The number of behavioral events which can be recorded is, thus, inversely proportional to the

size of the interval being used. As Collet and Semmel (1970) point out, decreasing the length of the coding interval would result in a greater number of "steady-state" tallies and, since the total number of tallies is increased, the probabilities of transitions between categories would be reduced. Although Collet and Semmel do not point it out, it is also likely that rapid changes in interaction that would be recorded under the shorter time interval will be omitted when the interval is longer. Thus it can be seen that the interpretation of fixed-interval coded data requires consideration of the length of the coding interval if misinterpretation is to be avoided.

Analytic techniques. The final issue to be considered in the evaluation of parent-child observation studies is the nature of the analysis procedures employed.

Until recently, analysis of observational data has been carried out solely by comparisons of the frequency of occurrence or the time spent in categories (Flanders, 1970).

Hess and Shipman (1965a, 1965c) recorded the number of messages falling into each category and used an exhaustive set of 147 t -tests to discover differences between the socioeconomic groups observed. Multiple correlational techniques were applied to point up relationships between interaction variables and other measures such as IQ, maternal influence techniques (assessed separately) and adequacy of the child's performance. Brophy (1969) employed similar techniques in the analysis of his data (77 t -tests), although a modified rating system was used in the coding of a portion of his interaction data.

An analysis of variance was used by Bee (1967) to test her hypotheses about differences in the behavior of parents of distractible and nondistractible children and differences in the observed behavior of the children themselves. Again, the data were related to frequency of occurrence of behaviors assigned to different categories.

Lewis (1972) and Tulkin and Kagan (1972) attempted to measure more complex aspects of interaction by including in their coding system indicators of observed sequences in the behavior under study. Analysis procedures still compared category frequencies, however.

Similarly, in the study by Jones and Moss (1971), the dependent variable was the percentage of time infants vocalized in each of the behavior states measured, with an analysis of variance used to assess the significance of obtained differences.

The complex coding and recording procedures utilized by Greenberg (1971) made it possible to measure several aspects of the mother-infant interaction, including both single and multiple variables. Although in the reported study no attempt was made to discover regularities in the sequences of behavior, it appears that such analysis would be possible if desired.

The analysis strategy reported in Bobbitt, Gourevitch, Miller, and Jensen (1969) included programs for (a) tabulating and graphing the frequencies, durations, relative frequencies and durations and other summary measures of the individual behavioral events, (b) comparing groups through trend analysis and analysis of variance of desired behavioral measures, and (c) identifying both simultaneous and sequential patterns of behavior

characteristic of a group. Statistical techniques were likewise more appropriate than those used by some other researchers--often in situations where they have questionable validity. Simultaneous patterns characteristic of a particular group were identified through contingency analysis using the chi techniques suggested by Cochran (1954). Although no comparable procedure for treating sequential patterns had been developed, the authors did identify sequential patterns that were significant for more than one dyad in a group (group N=4).

A relatively new approach to the treatment of sequential data has been proposed by Collet and Semmel (1970). Demonstrating the orthogonality (independence) of measures of time in category and number of transitions between categories, the authors pointed to the necessity for analyzing both data sources to provide a complete description of observational data. They also concluded that Markovian processes, which are useful for predicting the frequency of occurrence of behavior patterns, would not yield accurate predictions of the strategies which elicit specific responses. Instead, a technique for identifying families of chains--sets of category sequences with a common focal element as a precedent or a consequent--was explained.

A computer program containing procedures for the empirical validation of category systems and the identification of chains of interest to researchers was described. Strategies for analyzing the output of this program--called CHAIN--are still to be determined.

The advantages of computer-based coding systems (Greenberg, 1971) and analysis procedures (Bobbitt et al., 1969; Collet & Semmel, 1970) over attempts to look at sequential behavior by increasing the size of

the behavioral unit subsumed under each category and thereby increasing the cognitive load on the observer (e.g. Lewis, 1972; Tulkin & Kagan, 1972) would appear to lie in the greater precision and reliability of coding systems requiring that observers deal only with small, discrete units of behavior (Lytton, 1971) and in the obvious efficiency, flexibility and precision of computer programs which seek out regularities in the detailed, objective description of interaction provided by such coding systems.

Summary

Research on three topics germane to the study of teaching styles used by middle-class mothers with trainable mentally retarded children has been reviewed in this chapter.

Since any evaluation of teaching must consider the characteristics of the learners involved, research evidence of the learning characteristics of noninstitutionalized moderately mentally retarded children was reviewed. Implications of these findings for those who would teach the trainable retarded were outlined. In particular, it appeared that cognitive and linguistic development in these children follow similar paths to development in the nonretarded but that upper limits to attainment are lower (Woodward, 1959, 1963; Lenneberg, Nichols, & Rosenberger, 1964, Inhelder, 1968; Semmel & Dolley, 1971). Specific limitations in the ability to focus attention (Zeaman & House, 1963; Zeaman, 1965; Ullman & Routh, 1971; Wunderlich, 1971), to control behavior through the verbal system (Luria, 1961, 1963; Milgram, 1971) and to hold material in immediate memory (Scott & Scott, 1968) suggested that an important

aspect of maternal teaching would be the structuring of the environment and the focusing of the child's attention upon relevant stimuli (Zeaman, 1965; Santostefano & Stayton, 1967). Learning, once begun, appears to progress much as it does in the nonretarded (Zeaman & House, 1963; Zeaman, 1965; Belmont, 1966).

The attitudes of parents and their expectations regarding the capabilities of their trainable retarded children were considered as a second major factor influencing interaction styles. The attitude structure of such parents appears to be the result of forces for change in positive and negative directions. That is, such factors as adaptation to initial shock (Michaels & Schucman, 1962; Schucman, 1963) and the effects of counseling (Matheny & Vernick, 1969) and educational programs (Santostefano & Stayton, 1967) may tend to change parental attitudes in positive ways, while the continued pressures of living with and maintaining a retarded child in the family, which may increase as the child grows older (Worchel & Worchel, 1961; Farber, 1964; Cummings, Bayley, & Rie, 1966), exert a negative influence on attitudes and expectations. Wolfensberger (1967) has argued convincingly that the emphasis on the prevalence of parental rejection and the importance of parental acceptance may be so greatly overstated as to be a myth having reality only within the theories of the professionals who seek to explain the behavior of parents in terms of these constructs. The conflicting evidence from studies which have sought to define the correlates of these concepts may lend support to Wolfensberger's position. At the very least, the methodological weaknesses of studies using the PARI (Cook, 1963; Bell,

1964; Silverstein & Dingman, 1965; Ricci, 1970) and the Farber Index of Marital Integration (Farber, 1953; Fowle, 1968) make interpretation of the results obtained difficult.

The remaining studies reviewed used estimates of the retarded child's developmental level in terms of IQ (Capobianco & Knox, 1964; Gorelick & Sandhu, 1967; Heriot & Schmickel, 1967; Matheny & Vernick, 1969), score on the Cain-Levine Social Competency Scale (Tallman, 1965; VanEvery, Semmel & Sitko, 1972) or the Vineland Social Maturity Scale (Heriot & Schmickel, 1967). Overall, it appeared that parental estimates were higher than measured IQ or professional assessments of functioning. Although the usual explanation of this result has been in terms of unrealistic parental optimism or parental rejection of the knowledge of the limitations of the retarded child's capabilities, it may be that parental assessments are based on the observation of behaviors and abilities not tapped by existing IQ tests and not usually viewed within the professionals' more limited encounter with the retarded child.

As an alternative to the more common paradigm for studying parental attitudes, techniques for direct observation of mother-child interaction were reviewed. Problems in recording, encoding and analyzing this data were discussed.

Although the use of sound and filmed recordings of interaction has become increasingly common as an adjunct to or replacement of the categorization of behavior as it occurs, the adoption of mechanical aids in the coding or categorization process is much less widespread and is

reported in only two of the studies of mother-child interaction reviewed (Greenberg, 1971; Jones & Moss, 1971). In the other research reviewed, there was considerable variability in the kinds of information available after the data was recorded and coded. Of the remaining studies using sign systems, in which only the occurrence or absence (or in some cases the frequency) of behaviors in each of a set of predetermined behavioral incidents is recorded, one recorded only the frequency of behaviors (Hess & Shipman, 1965a, 1965b, 1965c, 1967; Brophy, 1969) while the others also recorded the approximate duration of each behavior (Bee, 1967; Lewis, 1972; Tulkin & Kagan, 1972). The duration of recorded behaviors can also be provided by the use of category systems in which every behavior is coded if the rate of coding is constant (Flanders, 1970). Researchers using category systems have made even less use of mechanical coding devices than have users of sign systems, even though these devices free the observer to attend to the interaction more closely than do techniques requiring that the observer write his tallies (Simmel, 1968).

Analysis of interaction data has ranged from consideration of the frequency of occurrence of particular categories (Hess & Shipman, 1965a, 1965b, 1965c, 1967; Bee, 1967; Brophy, 1969) through attempts to look at somewhat more complex aspects of behavior (Greenberg, 1971; Jones & Moss, 1971; Lewis, 1972; Tulkin & Kagan, 1972) to analysis of simultaneous and sequential patterns of behavior (Bobbitt, Gourevitch, Miller, & Jensen, 1969; Collet & Semmel, 1970).

In the following chapter, the model of maternal teaching styles and the observational and analytic model upon which the techniques of the present study are based are described. Research reviewed in chapters I and II provides the basis for these models.

CHAPTER III

THE MODELS

This chapter presents three behavioral models which were of primary importance in conceptualizing this study.

The maternal teaching styles model developed by Hess and Shipman (1965a, 1965b, 1968) provided the basic description of the effects of deprivation on mother-child interaction. It is the present writer's contention that deprivation occurs not only in the face of cultural and economic disadvantage but also in the face of parental confusion and pessimism regarding the capabilities of their child (Siegel & Harkins, 1963; Spradlin & Rosenberg, 1964; Shere & Kastenbaum, 1966; Jeffree & Cashdan, 1971).

The maternal instructional communication model described by Brophy (1969) served as the foundation for the observational system used, which encompassed behaviors characteristic of elaborated and restricted teaching styles (Hess & Shipman, 1965b).

The sequential behavior model characterizes strategies of chains focusing on particular events of interest in describing interaction (Collet & Semmel, 1970).

The Nature and Effects of Deprivation on Mother-Child Interaction.
The following points are basic to the model (Hess & Shipman, 1963).

The strategies by which man processes information and deals with the environment are learned. Bernstein (1961) argued that cognition-- including the content and characteristic processes or styles of thought-- is a function of language, and language is acquired as a function of

the structures of the social system including, as a primary structure, the family. Specifically, "different social structures may generate different speech systems or linguistic codes....Children who have access to different...linguistic codes, by virtue of their position in the class structure, may adopt quite different intellectual and social procedures which may be only tenuously related to their purely psychological abilities [Bernstein, 1964, p. 56-57]."

Mothers serve as the primary figures in organizing the social experiences upon which the preschool child's cognitive development is based and mother-child interaction provides the basic teaching-learning situation.

The strategies used by mothers in their interaction with their child affect his ability to grasp and retain a concept in any learning situation and also shape the cognitive structures or preferred response patterns that emerge in the child (Hess & Shipman, 1965a).

The maternal regulatory or control processes employed to orient the child to cues in the environment and the techniques used by the mother to organize stimulus information for the child have been of particular interest to these writers (Hess & Shipman, 1965a; Olm, Hess, & Shipman, 1967).

Maternal control strategies have been characterized as imperative-normal (demanding compliance without giving a reason or by referring only to social norms of behavior), personal-subjective (referring to internal emotional reactions of the child or of others whom his actions affect) and cognitive-rational (pointing to logical consequences of the

child's actions). Particularly important to the growth of cognitive processes are maternal control systems which provide an array of possible alternatives for thought and action, thus stimulating the development of the child's skills in identifying relevant stimuli within the environment and choosing rationally from among available possibilities for action. Development of these skills is impaired when control systems offer only predetermined solutions and few alternatives for consideration and choice.

The communication patterns by which a mother structures the environment for the child are described as restricted or elaborated by Bernstein (1961, 1964).

In his definition, restricted codes are stereotyped, limited, and condensed, lacking in specificity and the exactness needed for precise conceptualization and differentiation. Sentences are short, simple, often unfinished; there is little use of subordinate clauses for elaborating the content of the sentence; it is a language of implicit meaning, easily understood and commonly shared. The basic quality of this mode is to limit the range and detail of concept and information involved.

Elaborated codes are those in which communication is individualized and the message is specific to a particular situation, topic, and person. They are more particular, more differentiated, and more precise. They permit expression of a wider and more complex range of thought, tending toward discrimination among cognitive and affective content [Hess & Shipman, 1968, p. 94-95].

The nature of the mother-child dyadic exchange is related to the specific social structure within which it occurs. One indicator of likely differences in social structure is social class although, as Hess and Shipman point out, social class does not directly cause behavior but is, rather "a statement of probability that the child will encounter certain types of experiences [1968, p. 92]." One set of experiences encountered

with greater probability in lower social class families is associated with the behavioral, educational and economic poverty referred to as cultural deprivation or cultural disadvantage.

In the deprived family, a generally restricted and limited style of mother-child interaction appears to be characteristic. The control system relating parent to child restricts the number and kinds of alternatives for thought and action open to the child and prevents the child from learning to consider and choose from among various alternatives. As a result the child develops modes of dealing with stimuli which are impulsive, disconnected and concerned with immediate consequences rather than reflective, sequential and oriented toward future events. The communication between mother and child is similarly restricted--consisting mainly of stereotyped and condensed sentences, lacking in specificity, often left unfinished and relying more on implicit meanings than on precise expressions of content.

Nonverbal communication is used in place of rather than as an adjunct to and a means of clarifying verbal communication (Hess & Shipman, 1965a). As a result, although the mother may wish to help the child, her failure to provide enough cognitive meaning in her interaction may result not only in the failure of the child to learn but also in the development of negative reactions by the child to all cognitive learning situations (Hess & Shipman, 1965a). The authors interpret this communication failure as the primary factor in mother-child interaction patterns of the culturally disadvantaged and state that the most significant feature of the cognitive environment of the disadvantaged child is a "lack of pattern--repeated sequences of events which can be predictably related to other events

[Hess & Shipman, 1965a, p. 5]." As a consequence of this unpredictability, the child begins to show frustration, withdrawal, apathy, hostility and depressed cognitive functioning--reactions which interfere with subsequent learning and teaching processes.

In their investigation of the relationship of maternal linguistic and regulatory behavior to the information-processing strategies which this behavior induces in the child, Hess and Shipman (1965b) found that mothers' total verbal output, use of abstraction, structurally elaborate utterances and categorical rather than relational statements increased as socioeconomic status increased. Associated with these linguistic styles were differences in performance on each of the experimental tasks by the children, with better performance associated with use of elaborated patterns by the mother.

The picture that is beginning to emerge is that the meaning of deprivation is a deprivation of meaning--a cognitive environment in which behavior is controlled by status rules rather than by attention to the individual characteristics of a specific situation and one in which behavior is not mediated by verbal cues or by teaching that relates events to one another and the present to the future. This environment produces a child who relates to authority rather than to rationale, who, although often compliant, is not reflective in his behavior, and for whom the consequences of an act are largely considered in terms of immediate punishment or reward rather than future effects and long-range goals [Hess & Shipman, 1965b, p. 885].

The social class variables associated with adequacy or deprivation in mother-child interaction are important only as they reflect different probable experiential environments within which mothers and children function (Hess & Shipman, 1968). It must be remembered that other factors covarying with linguistic style in socioeconomic groups prevent attribution

of a direct causative link between use of elaborated patterns by mothers and problem-solving ability of children. Other variables associated in this probabilistic fashion with differences in the experiences available to developing children might then also be validly studied in order to specify the nature of their relationship to cognitive growth.

In the present study, the association of maternal expectations about a child's functioning with differences in mother-child dyadic interaction was investigated.

There is currently a controversy within the field of mental retardation as to whether retarded intellectual functioning in a child represents a developmental lag (a quantitative difference from the norm) or a defective intellectual capacity (a qualitative difference) (Zigler, 1966). These two interpretations of the behavior of the retarded relative to the behavior of "normals" have also been characterized as incompetence (quantitative differences) vs. deviance (qualitative differences) (Farber, 1968). Although it is not known to what extent mothers adopt either of these views of their retarded children, it appears likely that different predictions must be made about comparisons of maternal interaction style between groups as a function of whether mothers of mentally retarded children in the groups view these children as developmentally slowed or as qualitatively defective. It is Farber's (1968) contention that middle class parents tend to see the behavior of retarded individuals as evidence of deviance.

A mother's perception of her handicapped child may be seen in part in her rating of his level of social competence. If she views his impair-

ment as resulting in a prolonged but essentially normal period of development, it would be expected that her pattern of interaction with him should be similar to that used by all mothers with children of the same relative capability, whether these children be retarded or not. If, however, a mother views the development of her retarded child as defective and very different from that of a normal child, then her pattern of interaction with him may also be quite different from that used with a nonretarded child of an equivalent level of functioning.

Evidence from studies of language behavior suggested that perceptions of a child as significantly mentally retarded tended to result in modes of interaction between adults and children which would be characterized as restricted in terms of Bernstein's (1961) system--i.e., adults tended to use short, grammatically simple sentences, to ask binary questions and questions to which they knew the answers, and to use relatively restricted, unvarying vocabularies (Siegel, 1963a; Siegel & Harkins, 1963; Siegel & Donovan, 1964; Spradlin & Rosenberg, 1964). Jeffree and Cashdan (1971) found evidence that the severely retarded child exists in a limited, deprived environment in which many of the experiences normally available to nonretarded children are not provided for him. Marshall, Hegrenes, and Goldstein (1973) found that mothers working with retarded children used a greater frequency of questions, requests, demands, and commands (mands) through which a speaker controls the interaction situation than did mothers working with nonretarded children. Hence, it was expected that the Hess and Shipman model of mother-child interaction under optimal and deprived conditions would also describe maternal interaction with

nonretarded and trainable mentally retarded children.

In any comparison of the processes of maternal teaching, little information is gained if the mothers being studied are trying to teach different concepts--if the aims of their teaching are different (Hess & Shipman, 1965c). For this reason, investigators have increasingly studied the interaction of mothers and children in a standardized situation--holding constant the purpose of the interaction in order to observe differences in strategies for accomplishing this purpose (e.g. Hess & Shipman, 1965b; Kogan, Wimberger & Bobbitt, 1969).

In the structured interaction situation of the present study, mothers were asked to teach their children three tasks, each requiring different instructional strategies for optimal learning by the child (Hess & Shipman, 1965a; Brophy, 1969). In addition, a task which the child attempted to teach the mother was employed in order to observe the dyadic interaction in a situation where the more common roles of teacher and learner for mother and child were reversed.

The Communication Process. As Hess & Shipman point out, communication is not a simple process but is often a feedback chain in which initial failure of the receiver to comprehend the message as intended requires that the sender make additional attempts--reactive responses--until congruence of meaning for sender and receiver is attained (1965c). For this reason, in studying maternal communication as a system of information transmission, variables have included specificity of language, sequencing of information, attempts to obtain feedback from and subsequent confirmatory or corrective feedback to the child.

Brophy reported that "most mothers began with a period of orientation in which they explained and/or demonstrated the task to the child. During this time the child was expected to listen and watch.... Following orientation, the rest of the interaction then ordinarily consisted of rounds of responses in which the child attempted to [respond] and the mother corrected and/or questioned him [1969, p. 8]." This recursive post-orientation interaction has been divided by Brophy into prere-sponse instructions (advice to the child given before he responds) and post-response feedback (affirmation or correction given after the child responds).

In the present study, a similar sequence of mother-child interaction was predicted, and three primary segments of behavior were proposed: (1) Orientation-Motivation, (2) Explanation and (3) Question-Response-Feedback. Each of these units was further subdivided into specific interaction patterns.

The findings of Siegel and his associates (Siegel, 1963a, 1963; Siegel & Harkins, 1963; Siegel & Donovan, 1964) and of Spradlin and Rosenberg (1964) on the nature of the verbal interaction within dyads of adults and mentally retarded children have been integrated into the scheme developed by Hess and Shipman (1965b) for characterizing restricted and elaborated maternal teaching styles. This characterization of mother-child communication is consistent with the Marshall, Hegrenes, and Goldstein (1973). Restricted maternal interaction as described by these researchers include the following behaviors relative to elaborated styles: more commands, more narrow questions (especially binary questions), fewer

broad questions, more nonverbal demonstration, more nonverbal means of control, and less summarization and comment upon the child's behavior. A mother utilizing a restricted style will also allow less time for her child to respond than will a mother using a more complex pattern.

The specific coding scheme used in the present study was adapted from the coding categories used by Hess and Shipman (1967) and is presented in Table 1. A detailed description of each category is presented in Appendix A. Verbal interaction categories were rearranged to fit into the outline developed by Flanders (1960) in which the first seven categories describe talk by the teacher, the eighth and ninth categories describe talk from the learner and the tenth category is reserved for silence, confusion and other non-task-oriented behavior. For the present study, category one was used for motivation and control rather than for "accepts feeling" as is the case in the Flanders system. A modification of the distinctions proposed in the Miller-Hughes system (Amidon, 1967) between public and private criteria for praise and criticism have been incorporated into the affirmative and negative reply to feedback categories (two and seven). The specific subdivisions of these categories were framed in terms of the three maternal teaching styles differentiated by Olim, Hess and Shipman (1967). The questioning category (four) has been subdivided into three subcategories: narrow and broad questions as in the Flanders-Gess system (1968) and binary questions in which the permissible set of alternatives is stated explicitly or is restricted to "Yes" or "No." The binary/open distinction is derived from the work of Siegel and associates (Siegel, 1963a, 1963b; Siegel & Harkins, 1963;

TABLE 1

Coding Scheme: Mother-Child Interaction

Verbal Interaction Categories	
1 <u>Motivation and control</u>	6 <u>Command</u>
11 Verbal control	61 Compliance to be physical
12 Engaging	62 Compliance to be verbal
13 Orienting to task	7 <u>Negative reply to feedback</u>
2 <u>Affirmative reply to feedback</u>	71 Normative criteria
21 Normative criteria	72 Cognitive rational criteria
22 Cognitive-rational criteria	73 Personal-subjective criteria
23 Personal-subjective criteria	74 No criteria
24 No criteria	8 <u>Verbal response--elicited</u>
3 <u>Use of other's statement or behavior</u>	81 Attempt to respond
31 Repetition	82 Unable to respond
32 Questioning	9 <u>Verbal behavior--unsolicited</u>
33 Elaboration	91 Volunteers task-specific information
4 <u>Question</u>	92 Requests task-specific information
41 Binary question	10 <u>Task-irrelevant behavior, silence, confusion</u>
42 Narrow question	01 Task-irrelevant communication
43 Broad question	02 Silence
5 <u>Providing task-relevant information</u>	03 Unintelligible interaction
51 Focus or verbal point	04 Uncodable due to mechanical difficulty
52 Task informing (explaining)	
Nonverbal Interaction Categories	
1 <u>Point</u>	5 <u>Physical response--elicited by task demands</u>
2 <u>Demonstration</u>	6 <u>Task-irrelevant behavior</u>
3 <u>Physical restriction</u>	61 Irrelevant behavior within situation
4 <u>Physical response--elicited by other</u>	62 Attempt to leave situation--escape
41 Attempt to respond	7 <u>No response</u>
42 Indeterminant	

Siegel & Donovan, 1964). Nonverbal interaction categories do not correspond to any "larger" or superordinate system, but include the subdivisions for elaboration, response, physical restriction, and irrelevant behavior which were identified in the Chicago Preschool Study (Hess & Shipman, 1967). The terms "teacher" and "learner" do not refer exclusively to either the mother or the child. Rather, the "teacher" is that member of the dyad who is defining the situation and directing the behavior of the other. It is conceivable that this role may shift from mother to child as the task requirements are changed.

Identification of Sequential Strategies. The use of the term "interaction style" in the present study differs in meaning from Hess and Shipman's (1965b) definition. For them, differences in frequency of individual interaction categories constituted differences in interaction style; no provision was made for consideration of regularities in the sequential aspects of behavior. In the present work, however, the sequential chains of behavior constituted the basic data. Differences in these sequential patterns of categories defined differences in interaction style.

Five sets of patterns were extracted from the mother-child interaction records using an analysis strategy developed to identify sequential regularities in behavior (Collet & Semmel, 1970). These pattern sets were derived from a consideration of the kinds of interactions likely to occur as a result of the demands of the experimental tasks, characteristics of the learners, attitudes of the parents, etc. (Hess & Shipman, 1965a, 1965c). The predicted flow of interaction is presented in terms of the three primary segments of behavior discussed above.

The Orientation-Motivation component encompasses the mother's attempts to motivate her child and to orient him to the general requirements of the task. For example, an interaction sequence which would be classified within this component would be one in which the mother says: "We're going to play a game with blocks. We have to separate them into different groups. I'll show you how to do it first." Verbal category 1 is of primary importance in this component.

The second and third points in the interaction sequence (Explanation and Question-Response-Feedback) were each subdivided into elaborated and restricted patterns.

Explanation patterns are concerned with the provision of task-relevant information by the teacher to the learner. A broad or elaborated explanation pattern coordinates the verbal presentation of task-relevant information with nonverbal cues focusing the learner's attention properly. Verbal category 52 (task informing) and nonverbal category 10 (point) dominate broad explanation patterns. An example of such a pattern would be: "We have to make a square with the Etch-A-Sketch. When you turn your knob to the right [Points to the right.] the line will go up, and when you turn your knob to the left or counterclockwise [Points to the left.] the line will go down. My knob makes the line move to the left or to the right."

A narrower, more restricted explanation pattern consists of verbal and nonverbal "pointing" behaviors by the teacher which require the learner to use little of his ability to decode verbal messages. Verbal category 51 (verbal point) and nonverbal category 20 (demonstration) define this pattern. Behavior classified as a restricted explanation pattern might

include: "We have to make a picture like this one [Points to card.] When you do this [Turns knob to the right.] the line will go this way [Points to the top of the screen.] and when you do this [Turns knob to the left.] the line does this [Points to bottom of screen.]"

Elaborated Question-Response-Feedback sequences incorporate more varied and complex verbal behavior than do restricted patterns, including non-binary questions (verbal category 42, 43), commands (verbal category 62), and feedback giving personal-subjective or cognitive-rational criteria (verbal category 22, 23, 72, 73). An interaction segment which would be included would be the following, for example: (Mother) "What color is this block?" (Child) "Red." (Mother) "Where is there another block that is the same color?" (Child) [Picks up a green block.] (Mother) "No, that block is not the same color as the one you showed me before."

Restricted Question-Response-Feedback patterns are constructed of sequences of binary questions (verbal category 41), commands (verbal category 61), and feedback with normative criteria or no criteria at all (verbal category 21, 24, 71, 74). A restricted or narrow sequence might be similar to the following: (Mother) "Is this block red?" (Child) "Yes." (Mother) "Give me another red block." (Child) [Picks up a green block.] (Mother) "No, that's wrong."

Sequences in which the teacher asks a non-binary question but gives feedback with normative criteria or no criteria or in which the teacher asks a binary question but gives personal-subjective or cognitive-rational criteria for feedback are considered to be "hybrid" patterns, intermediate between elaborated and restricted patterns.

The analysis strategy proposed by Collet and Semmel (1970) is based upon a model of sequential events which differs from the more commonly applied Markovian model. In terms of a Markov process model, it is assumed that all the information necessary for predicting the event occurring at a stage n is contained in the immediately preceding k stages where k is less than or equal to $n-1$. Such processes have utility for certain kinds of problems, including prediction of future events and prediction of the frequency of particular chains. However, for purposes of identifying strategies for eliciting a particular response (chains of categories associated with the occurrence of a specified category of behavior), the Markovian model is inappropriate. In its place, Collet and Semmel suggest that "for any given consequent within a specified category system there exists a strategy (i.e., a chain of finite length) which regularly and reliably yields a maximal probability of eliciting the desired consequent [p. 8]." Thus, in the Markov model, the sequence of events is known, and the problem lies in predicting future states of the system. In the model proposed by Collet and Semmel, the outcome or focal element of the chain is known; the problem is to describe a strategy with maximal probability of eliciting this focal element. To identify this strategy the authors consider families of chains for which there is a common focal element either as a precedent (starting point) or a consequent (end point). The differential occurrence of these families of chains in the interaction of subject-groups provides the data for the testing of research hypotheses.

In summary, this chapter has presented models of mother-child interaction and communication under enriched and deprived conditions. Communication patterns differentiating elaborated and restricted maternal teaching

styles were described and the basic assumptions of an analysis technique for identifying behavior strategies were outlined.

In the chapter which follows, the specific hypotheses derived from these models are presented. It was predicted that maternal role, perception of the child's level of social competence, IQ and chronological age, and the requirements of the tasks would affect the percentage of interaction accounted for by elaborated and restricted chains and by the use of Orientation, Explanation and Question-Response-Feedback patterns.

CHAPTER IV

HYPOTHESES

Studies by Spradlin and Rosenberg (1964) and by Siegel and his associates (Siegel, 1963a, 1963b; Siegel & Harkins, 1963; Siegel & Donovan, 1964) indicating that adults use different verbal behaviors with mentally retarded children of high and low verbal ability provided a basis for the research hypotheses presented below. The model of maternal teaching styles developed by Hess and Shipman and their associates (Hess & Shipman, 1965a, 1965b, 1968; Olim, Hess & Shipman, 1967; Brophy, 1969) and described in the preceding chapter was adopted.

One of the major hypotheses of the present study is that middle-class mothers of moderately mentally retarded children view their children as defective, not just as functional equivalents of younger non-retarded children (Farber, 1969). As a result of these perceptions, mothers provide less cognitive and linguistic stimulation, use more nonverbal means of communication and employ more of the restricted codes described by Bernstein (1961) in their interaction with their trainable retarded child than in their interaction with a nonretarded child (Shere & Kastenbaum, 1966; Jeffree & Cashdan, 1971).

Specifically, the study compared interaction styles used by middle-class mothers with a nonretarded child to interaction styles used by these same mothers with their moderately retarded child and compared interaction styles used by middle-class mothers with a nonretarded child to interaction styles used by middle-class mothers with a trainable

retarded child of the same chronological age or level of social competence.

The relationship of the mother's perceptions of the child's level of social competence to interaction strategies she used with retarded and nonretarded children was examined. Finally, the effects on maternal interaction of differences in the role (teacher or learner) assigned to the mother and differences in the kinds of verbal mediation required of a mother whose role was that of a teacher were investigated.

Hypotheses are framed in terms of differences in the percentage of the interaction of middle-class mothers with trainable mentally retarded or nonretarded children that is accounted for by specified patterns.

Differential response to the experimental tasks by the members of the subject groups was predicted. For this reason, hypotheses were formulated separately in terms of the ascribed maternal role as teacher or learner. Within each section, the effects of the independent variables of IQ, level of social competence and task differences upon the percentage of interaction accounted for by elaborated patterns, restricted patterns, Orientation, Explanation, or Question-Response-Feedback patterns were predicted.

Effect of Level of Social Competence.

Hypothesis 1: The percentage of interaction accounted for by elaborated patterns increases as the mother's rating of the child's level of social competence increases within diagnostic categories.

Hypothesis 2: The mother's perception of her child's functioning ability is the strongest predictor of the interaction style she will use with him.

- 2a. In the total sample, measures of the mother's perception of her child's level of social competence are the strongest predictors of maternal interaction pattern.
- 2b. In dyads of mothers and trainable mentally retarded children, measures of the mother's perception of her child's level of social competence are the strongest predictors of maternal interaction pattern.

Although it was predicted that mothers of moderately retarded children adopt a "defect" orientation toward these children (Farber, 1968), it was maintained that, within the retarded and nonretarded groups of subjects, mothers would use more elaborated patterns with their children as they perceived these children to be developing more competence. Within the total sample, it was predicted that the measure of level of social competence would still be a powerful predictor of interaction style.

A. Ascribed role: Mother as teacher.

Effect of differences in the verbal mediation required by the task on the type of pattern used.

Hypothesis 3: In the condition in which the mother is teaching, the verbal mediation requirements of the tasks are reflected in differential increases in Explanation and Question-Response-Feedback patterns when experimental teaching tasks are compared.

- 3a. In all groups, the increase in the use of Question-Response-Feedback patterns is greater when Sorting and Etch-A-Sketch* tasks are compared than when the Etch-A-Sketch and Block Stacking tasks are compared.

*The Etch-A-Sketch is a commercially manufactured drawing toy. It is a small, flat box with a plastic screen and two knobs to control vertical and horizontal movement of a stylus within the box. Lines are drawn upon the screen as the movements of the stylus scratch across a film of powdered aluminum on the inside of the screen.

- 3b. In all groups, the increase in the use of Explanation patterns is greater when Block Stacking and Etch-A-Sketch tasks are compared than when the Etch-A-Sketch and Sorting tasks are compared.

Different types of verbal mediation are required of the mother as different teaching tasks are introduced. It was predicted that all mothers would adapt to these changes by increasing their use of "relevant" patterns for each task.

In a block stacking task, for example, the mother is required to orient the child to the general nature of the task and motivate him to imitate her actions. By contrast, in the Etch-A-Sketch task, orientation and motivation are still necessary, but the mother must control the child's behavior closely. The use of both Explanation patterns and Question-Response-Feedback patterns was expected to increase on this task and on a third task taught by the mother (i.e., the sorting task). However, the greatest increase in the use of Question-Response-Feedback patterns as a means of behavior control was expected to occur in the Etch-A-Sketch task when compared to the block stacking task. The sorting task required that the mother communicate the relevant stimulus dimensions to the child and was expected to lead to a greater increase in the use of Explanation patterns (Brophy, 1969).

Effect of the child's perceived abilities on level of pattern used.

Hypothesis 4: In the condition in which the mother is teaching, both IQ and level of social competence are associated with differences in the percentage of interaction accounted for by elaborated and restricted patterns.

- 4a. The percentage of interaction accounted for by elaborated patterns is greater for mothers interacting with nonretarded children than for mothers interacting with trainable retarded children of the same CA or level of social competence.
- 4b. The percentage of interaction accounted for by elaborated patterns is greater for mothers interacting with trainable mentally retarded children having a level of social competence of four years than with trainable mentally retarded children whose CA is four years.
- 4c. The percentage of interaction accounted for by restricted patterns is less for mothers interacting with nonretarded children than for mothers interacting with trainable retarded children of the same CA or level of social competence.
- 4d. The percentage of interaction accounted for by restricted patterns is less for mothers interacting with trainable mentally retarded children whose level of social competence is four years than for mothers interacting with trainable retarded children whose CA is four years.
- 4e. The difference in the percentage of interaction accounted for by elaborated patterns is greater when dyads of mothers and trainable retarded children are compared with dyads of these same mothers and older siblings of the retardates than when dyads of mothers and trainable retarded children are compared with dyads of these same mothers and younger siblings of the retardates.
- 4f. The difference in the percentage of interaction accounted for by restricted patterns is greater when dyads of mothers and trainable retarded children are compared with dyads of these same mothers and older siblings of the retardates than when dyads of mothers and trainable retarded children are compared with dyads of these same mothers and younger siblings of the retardates.

Effect of the child's perceived abilities on the type of pattern used.

Hypothesis 5: In the condition in which the mother is teaching, the percentage of interaction accounted for by Orientation patterns increases as the child's ascribed capability increases.

- 5a. The percentage of interaction accounted for by Orientation patterns is greater for middle-class mothers interacting with nonretarded children than for middle-class mothers interacting with trainable mentally retarded children of the same CA or level of social competence.
- 5b. The percentage of interaction accounted for by Orientation patterns is greater for mothers interacting with trainable retarded children whose level of social competence is four years than for mothers interacting with trainable retarded children whose CA is four years.
- 5c. The difference in the percentage of interaction accounted for by Orientation patterns is greater when dyads of mothers and trainable retarded children are compared with dyads of these same mothers and older siblings of the retardates than when dyads of mothers and trainable retarded children are compared with dyads of these same mothers and younger siblings of the retardates.

The above predictions are related to the primary thesis of the study--that middle-class mothers perceive trainable mentally retarded children as impaired or defective individuals, not just as individuals who develop more slowly than nonretarded children (Farber, 1968). It was predicted that such a view would be reflected in qualitative differences in the way mothers interact with their trainable retarded and nonretarded children.

As a result of their lower expectations for their child's abilities, it was expected that mothers of moderately mentally retarded children would provide less complex verbal patterns to be encoded and would require less complex behavior from these children than from their older or younger nonretarded children. Rather than expect the retarded child to encode the relevant aspects of the tasks and describe them verbally, the mother would simply expect the child to follow instructions or answer simple questions for which the alternatives have been supplied. With

nonretarded children, however, the middle-class mothers would be expected to express their orientations toward the use of language for the organization of experience and require these children to verbalize more. As a function of the perceived defect in the retarded child, differences in teaching patterns should be greater when maternal interaction with a moderately retarded child is compared with interaction of the mother and an older sibling of this retarded child than when dyadic interaction of a mother and her trainable retarded child is compared with dyadic interaction of the mother with a younger sibling of the retardate.

B. Ascribed Role: Mother as learner.

Hypothesis 6: In the condition in which the child is teaching, both IQ and level of social competence are associated with differences in the percentage of interaction accounted for by maternal Explanation and Question-Response-Feedback patterns.

- 6a. The percentage of interaction accounted for by Explanation and Question-Response-Feedback patterns is less for mothers interacting with nonretarded children than for mothers interacting with trainable mentally retarded children of the same CA or level of social competence.
- 6b. The percentage of interaction accounted for by Explanation and Question-Response-Feedback patterns is greater for mothers interacting with moderately retarded children with a CA of four years than for mothers interacting with moderately retarded children having a level of social competence of four years.
- 6c. The difference in the percentage of interaction accounted for by Explanation and Question-Response-Feedback patterns is greater when dyads of mothers and trainable retarded children are compared with dyads of these same mothers and older siblings of the retardates than when dyads of mothers and trainable retarded children are compared with dyads of these same mothers and younger siblings of the retardates.

In a situation where the child was attempting to teach the mother a task, it was predicted that the low expectancy of a mother for the capability of her trainable mentally retarded child would cause her to "take over" control of the situation from the child. Rather than being an attempt to bring structure to his environment, this would represent her concept of her retarded child as largely incapable of performing adequately and her unwillingness to wait and see what his behavior would be. It was expected that the result of such a lower expectancy for the moderately retarded child would serve to increase the difference in maternal interaction style between two children when the retardate is the younger child chronologically and to narrow the discrepancy when the retarded child is the elder.

In summary, the hypotheses presented above compared maternal interaction strategies used by middle-class mothers with moderately retarded children to strategies used by middle-class mothers with nonretarded children. These predictions were framed in terms of (a) differences in maternal control strategies used by the same mother in interaction with her moderately retarded and nonretarded children and (b) differences in maternal control patterns used by a mother with a trainable retarded child when compared with the patterns used by a mother with a nonretarded child of equivalent chronological age or measured level of social competence.

It was predicted that a primary determinant of maternal interaction in an instructional situation is the mother's perception of her child's capabilities--particularly his communication, self-care, independence and social skills.

It was expected that the mother's ascribed role as teacher or learner would differentially affect mothers interacting with their moderately retarded children and mothers interacting with nonretarded children.

In keeping with a hypothesized "defect" orientation of middle-class mothers toward their trainable retarded children, it was predicted that a more restricted teaching style would be used by these mothers than would be seen in mothers interacting with nonretarded children of similar chronological age or measured level of social competence. Mothers interacting with retarded children were also expected to resist being put in the role of learners when their children were the teachers and to "take over" control of the interaction to a greater degree than would mothers interacting with nonretarded children under the same conditions.

For all groups of mother-child dyads, the verbal mediation requirements of the maternal teaching tasks were expected to require qualitatively different kinds of interaction which would be reflected in changes in the kinds of patterns used when tasks were compared.

In the following chapter, the research design and procedures for an empirical test of the hypotheses are presented.

CHAPTER V

METHOD

Following is a description of the selection of dyads of mothers and children and the procedures by which the hypotheses presented in Chapter IV were tested.

Subjects

Criteria for the selection of subjects were (1) chronological age of the child; (2) level of social competence of the child; (3) middle-class status of family; (4) absence of gross motor and sensory impairment in the child; and (5) presence of younger or older nonretarded siblings in the family.

The research design required the selection of three groups of mother-child dyads: a group of mothers with nonretarded children whose chronological ages were four through six years (Group I), a group of mothers with trainable mentally retarded children who were matched with the nonretarded children on chronological age (Group II), and a group of mothers with trainable retarded children who were matched with the nonretarded children on a measure of social competence (Group III). Each of these groups was divided into two subgroups. In subgroup I-A each mother was asked to participate in the experimental conditions with her four-through six-year-old nonretarded child and, in another session, with a younger sibling of this child. Similarly, in groups II-A and III-A each mother was asked to interact with her retarded child and with a younger nonretarded sibling of this child. In subgroup I-B each mother was asked to participate in the experimental conditions with her four-through six-year-

old nonretarded child and, in another session, with an older nonretarded sibling of this child. In groups II-B and III-B each mother was observed in interactions with her retarded child and with one of his older nonretarded siblings. Table 2 presents the structure of these groups.

TABLE 2

Experimental Design: Group Characteristics

<u>GROUP I-A</u> *Nonretarded child, CA range, 48-83 months Mother Younger nonretarded sibling	<u>GROUP I-B</u> *Nonretarded child, CA range, 48-83 months Mother Older nonretarded sibling
<u>GROUP II-A</u> *TMR child, CA range, 48-83 months Mother Younger nonretarded sibling	<u>GROUP II-B</u> *TMR child, CA range, 48-83 months Mother Older nonretarded sibling
<u>GROUP III-A</u> *TMR child, LSC equivalent to Group I-A Mother Younger nonretarded sibling	<u>GROUP III-B</u> *TMR child, LSC equivalent to Group I Mother Older nonretarded sibling

*"Target" children: Basis for matching of sample groups.

CA: chronological age in months

LSC: Level of social competence--determined by Cain-Levine Social Competency Scale total scores.

All dyads for Group I (mothers and nonretarded children) were obtained in Washtenaw County, Michigan, from a cooperative nursery school in Ann Arbor and from an apartment complex housing university student families for the most part. Finding a sufficient number of cooperative families fitting the selection criteria for Groups II and III (mothers, trainable retarded children of specified ages and nonretarded younger or older siblings) was considerably more difficult, however; and it was necessary to go to four different geographic locations--Washtenaw and Oakland counties in Michigan, and Allen and Marion counties in Indiana--before the sample was completed. In each of these counties, parent- and school-operated programs for the trainable mentally retarded identified prospective subject families fitting the selection criteria.

For the purpose of the study, level of social competence was measured by subscale and total scores on the Cain-Levine Social Competency Scale (Cain, Levine, & Elzey, 1963). This measure has a more objective base than do many rating scales in that its items require the rater to indicate specific skills which the child has or lacks within his behavioral repertoire. The behaviors in question are sufficiently specific and commonly occurring as to permit generally accurate decisions by the rater. Nevertheless, a somewhat subjective component of these scores has been demonstrated in the differences in ratings of a single child by various adults who are acquainted with him. Tallman (1965) and VanEvery, Semmel, and Sitko (1972) found consistent differences in the ratings by teachers and parents of trainable retarded children. Tallman interpreted these results as reflecting parental role differences which shape the perceptions of the child's capabilities. VanEvery, Semmel, and Sitko also pointed to

differences in expectations about the child which were related to differences in roles of teachers and parents, and they suggested additionally that the results are congruent with differences in the type and frequency of opportunities to observe and interact with the child. In the present study the Cain-Levine provided a relatively direct measure of the mother's perception of her child's functioning abilities in areas closely related to their life-style by looking at Self-Help, Social Skills, Initiative and Communication skills. This test has been standardized on trainable retarded individuals (Cain, Levine & Elzey, 1963; Semmel & Dolley, 1970); hence there are no norms covering the functioning of nonretarded children. However, it was possible to select retarded children for Group III who were functioning at a level comparable to that of the nonretarded four-through six-year-old children in Group I by determining the percentile equivalents of the Cain-Levine total scores for this nonretarded group and matching this distribution to the most similar age group from the Cain-Levine norms (Semmel & Dolley, 1970).

Mothers filled out the Cain-Levine Social Competency Scale for each of their children who were to be involved in the study. An additional information sheet completed by the mothers listed the number and ages of children in the family, and the educational attainments and occupation of parents. This form is presented in Appendix B.

The child's chronological age provides an indicator of developmental level for the nonretarded child and, for the retarded child, provides a marker by means of which his parents often assess the degree of his deviance.

The number of children in the family was seen as an important factor affecting mother-child interaction, although the specific relationship of family size and communication style appears to be complex. That is, more children in a family may represent increased pressures on the parents' time which limit communication with individual children. The earlier acquisition of language and the generally higher IQs of only or first-born children have been well-documented (Clausen, 1966) and are often attributed in part to the greater amount of verbalization and interaction of parents with these children. However, with more children, the parents may gain confidence and competence as child-rearers which may make them more effective parents. Such an effect could lessen the negative correlation between the number of children in a family and the complexity of mother-child interaction suggested by the data on first-born and only children, particularly if only families of moderate size are being studied.

The father's occupation was the basis for assigning middle-class status to the family. A family was defined as middle-class when the occupation of the father was in a managerial, executive or professional category.

Finally, the educational attainments of the mother and father were noted. In the present study, the range of education was presumably restricted by the socioeconomic-status criteria used in the selection of families. Within this limitation, the association of different interaction patterns with differences in parental education would provide further evidence of the strength of this variable as a determinant of parental interaction style.

Table 3 presents the mean and standard deviations of the following descriptive measures for each group of subjects: chronological age, Cain-Levine Social Competency Scale subscale and total scores, number of children in the family and maternal and paternal educational attainments.

Experimental tasks

The remaining independent variables were those associated with the experimental tasks themselves. These tasks were selected to elicit different types of mother-child interaction by requiring different kinds of teaching behavior of the mother and by assigning the role of teacher to the child on one task. In all conditions, instructions to dyads focused attention away from the mother's behavior and toward the behavior of the child as suggested by Bell (1964) and Siegel (1963a, 1963b).

The tasks and instructions are described below. The materials used in the experimental tasks are pictured in Appendix C.

Block stacking

Materials: Twenty 1 3/4" x 1 3/4" x 3/4" Playskool¹ wooden blocks (ten unpainted, ten blue).

Instructions: "Will you make first a tower and then a bridge with blocks of one color and have your child copy each structure with blocks of the other color."

Block designs

Materials: Two sets of blocks from the Block Design subtest of the WISC; three white cards on which are drawn block patterns in color.

¹ Registered and patented by Playskool, Inc., a Milton-Bradley Company, Chicago, Ill., 60618.

TABLE 3

Means and Standard Deviations of Descriptive Measures
for Target Children and Siblings of Each Group (N=5, each group)

Target Subjects:		Nonretarded		Younger retarded		Older retarded	
		I-A	I-B	II-A	II-B	III-A	III-B
CA	$\bar{X}$	65	62	72	57	163	152
	s_x	3.37	6.37	8.92	5.04	6.37	13.19
Self-Help	$\bar{X}$	43	37	28	22	40	46
	s_x	3.54	6.01	8.69	3.29	7.29	14.09
Initiative	$\bar{X}$	28	27	22	14	27	28
	s_x	2.04	4.87	6.47	6.23	2.22	7.71
Social Skills	$\bar{X}$	34	28	20	14	27	28
	s_x	2.58	5.34	7.52	3.16	3.85	8.93
Communication	$\bar{X}$	39	38	23	14	28	32
	s_x	1.55	1.86	9.09	4.22	9.56	6.14
Total	$\bar{X}$	144	129	92	64	123	135
	s_x	8.17	16.21	29.43	13.23	12.50	33.49
# children in family	$\bar{X}$	2	3	2	4	3	4
	s_x	0	1.17	0.49	1.27	1.36	2.04
Father's education	$\bar{X}$	10	9	6	6	5	7
	s_x	0.49	1.27	2.23	2.53	2.06	2.00
Mother's education	$\bar{X}$	8	8	3	5	3	6
	s_x	0.75	1.74	0.40	1.96	1.63	1.47
Siblings:		I-A	I-B	II-A	II-B	III-A	III-B
CA	$\bar{X}$	42	83	43	85	136	179
	s_x	4.56	5.78	12.94	25.58	6.15	20.89
Self-Help	$\bar{X}$	25	48	34	46	58	60
	s_x	4.22	4.05	9.65	3.66	2.10	0.40
Initiative	$\bar{X}$	18	31	27	28	36	38
	s_x	2.33	4.49	5.78	3.72	4.07	3.60
Social Skills	$\bar{X}$	22	35	27	33	39	41
	s_x	2.32	3.50	6.97	1.27	2.79	2.80
Communication	$\bar{X}$	35	40	31	40	40	40
	s_x	3.66	0	9.68	0.45	0	0
Total	$\bar{X}$	101	155	120	146	173	179
	s_x	9.30	11.25	27.22	8.80	8.90	6.80

Instructions: "Without letting your child see the designs on these cards, would you copy the first design with your set of blocks and have (child's name) copy your design with the second set. Then copy the second design and the third."

Etch-A-Sketch

Materials: An Etch-A-Sketch² is a small, flat box with a screen on which lines are drawn by moving a marker within the box which scratches into a film of powdered aluminum on the screen. The marker is controlled by two knobs on the outside of the box: one causing horizontal movement of the stylus and the other causing vertical movement. Each mother was given three Etch-A-Sketches on which the marker was centered and three white cards the size of the screen on which were black line drawings of a square, a block T and a plus sign. (Mothers working with older nonretarded children received a plus sign, three diagonally-linked squares, and a block E).

Instructions: "I want you and your child to copy these three designs on these Etch-A-Sketches. You will have control of one knob; he (she) has control of the other. When the horizontal knob is turned clockwise, the line moves to the right; when it is turned counterclockwise, the lines move to the left. Turning the vertical knob clockwise moves the line up and turning it counterclockwise moves the line down." [To mother]: "Now let's practice making a square." [Experimenter and mother make a square cooperatively.] "Working with (child's name), please copy these three designs. Use a separate Etch-A-Sketch for each design."

Sorting
task:
(Objects)

Materials: Small plastic clothespins, small plastic cowboys, baby socks (Six of each: two in each of three colors: red, yellow, green).

² Registered and patented by The Ohio Art Co., Bryan, Ohio

me) to do these tricks so he (she) can do them without help."

Trick A: Disappearing knot. Two slip knots are formed--one atop the other and tight enough to appear to be a single, complex knot. After commenting on his magical abilities, the "magician" claims to be able to make the large knot disappear from the rope without untying it. So saying, he jerks the ends of the rope and pulls the knot out.

Trick B: Rope that counts. The "magician" claims to be able to command the rope to tie any number (less than ten) of knots in itself as he drops it from his hand. As his audience decides on the number of knots, the "magician" coils the rope in his left hand, taking care that the end of the rope hangs behind the loop which he lays in his hand. One coil is made for each knot to be tied, and the "magician" then shakes out the rope, holding the end preceding the first loop which he has pulled through the coils. The specified number of knots should appear in the rope.

Play-Doh
Coin
Maker

Materials: A Play-Doh Coin Maker³ is a commercially-available toy consisting primarily of a hinged device--much like a hamburger press--made of green plastic. Into a hole in each section the user puts a plastic template containing the indentations for designs on the faces of the "coins" to be made. Across one of these templates the child places a piece of aluminum foil--approximately 3" x 8". He places a ball of Play-Doh (a clay-like modeling compound) on the foil, folds the foil over the compound and closes the Coin Maker as tightly as possible. He then opens the Coin Maker, takes out the foil-covered "coin" and trims off the excess foil with scissors. Each

³ Registered and patented by Rainbow Crafts, Inc., Cincinnati, Ohio, 45212.

Instructions: "I would like to have you teach your child to sort these objects, first by color and then, after he has done that, by putting the different kinds of objects in different piles. You can teach him any way you choose and give any help you feel is necessary, but please continue until he doesn't require specific instruction on where to put each object."

Sorting
task
(Blocks)

Materials: Twelve blocks from the Sigel Sorting Task (Sigel, 1963). Each wooden block represents the coordination of four categories: height (tall, short); color: (red, yellow, blue, green); mark on top (X, O); shape (circle, rectangle). Eight blocks were presented for teaching with a 17" x 11" sheet of paper divided into quadrants. The remaining four blocks were set aside in a small sack to test the child's learning.

Instructions: "Now I want you to teach your child to sort these blocks both by height and by the mark on top. That is, tall X's are in a different pile from tall O's and from short X's. You'll have blocks of several colors and both square and round shapes in each pile. When your child has sorted all eight blocks into the proper piles and you feel he knows what you want, ask him to put the blocks from this other sack into the proper groups with the eight he has already sorted. Keep going until he has correctly placed two of these test blocks without prompting from you."

Magic
tricks

Materials: Two lengths of 1/8" diameter nylon rope--one 30" long, the other 72" long.

Instructions: "I'm going to teach you two magic tricks using this rope. After you've learned them and can do them without help, we'll have (child's name) come back into the room. After you've shown off what you've learned, I want you to teach (child's

child was given the Coin Maker, Play-Doh, three pieces of foil and scissors when he went to teach his mother the task.

Instructions: [To child] "I'm going to show you how to make some play money out of Play-Doh that you could use when you play store." [The experimenter demonstrates until the child makes one correctly on his own.] "Your mommy doesn't know how to make this money. I want you to take all the Play-Doh and the Coin Maker back to where she's sitting and teach your mother how to make this money out of Play-Doh."

Origami
owl

Materials: 10" x 10" squares of Origami paper folded into a kite shape. The child was given two pieces of this paper to use in teaching his mother. Scissors.

Instructions: [To child] The experimenter describes and demonstrates the process of making the owl. Then the child makes an owl. The experimenter then said, "Now go back and teach your mother to make an owl like this one. Have her make one."

All target subjects and nonretarded siblings with a chronological age of eight years or less received the following tasks: block stacking, Etch-A-Sketch (designs: square, T, plus), sorting (object, Sigel blocks), Play-Doh Coin Maker. Nonretarded siblings older than eight years received the following tasks: block design, Etch-A-Sketch (designs: three squares, plus, E), magic tricks, Origami owl. The first three tasks in each group were taught by the mother. In the case of the Play-Doh or the Origami owl, the experimenter taught the procedure to the child who was then instructed to teach the task to his mother. Order of presentation was balanced across dyads, with the restriction that the condition using the

child as teacher always occurred last.

The inclusion of different tasks made it possible to observe the interaction of mothers and children under conditions in which the behavior required of the mother was varied. Specifically, it was desired that changes in tasks necessitate changes in the relative importance of the three components of the dyadic teaching sequence discussed in Chapter III (Orientation, Explanation, and Question-Response-Feedback) in order that qualitative or quantitative differences in the use of patterns from each component could be observed.

In all three sets of tasks which the mother taught, it was necessary for her to motivate the child to participate. In the stacking of blocks or copying of block designs, there was little need for the mother to regulate or control specific acts by the child or to explain aspects of the task for him. Control and regulation of the child's behavior, in addition to motivation, were necessary when the task was the copying of Etch-A-Sketch designs, since the mother had to tell the child when and in what direction to move the knob he controlled. The third task--block sorting or magic rope tricks--required that the mother motivate and control the child's behavior and that she point out the relevant dimensions of the stimulus array for him (Hess & Shipman, 1965c; Brophy, 1969). The mother could motivate and control the child and structure the task environment for him through cues presented verbally or nonverbally.

A situation in which the child was showing the mother how to use a Play-Doh Coin Maker or how to make an origami owl (a task which he had been taught by the experimenter) was the final condition. This was justified to mothers as an indication of whether children communicate better to familiar adults than to strangers.

Data collection

All sessions were recorded on one-half inch videotape by a Sony camera and video recorder mounted in the experimental room.

Each mother was observed in consecutive sessions with the two of her children involved in the study. The order of testing of "target" and "sibling" was balanced across dyads.

Data coding

Data were coded and preliminary analyses made by using the last two stages of the cybernetic analysis and feedback system developed and designated CATTS (Computer-Assisted Teacher Training System) by Semmel (1968, 1972; Semmel, Olson, & Weiske, 1972). Two coders observed each videotape and coded the behaviors observed by means of the coding system presented in Appendix A. One person coded verbal behavior while the second simultaneously and independently coded nonverbal (extraverbal) behavior. Coding was done by button presses on a 10-button coding box which directed data into a PDP-4 computer. A coding move was made whenever the interaction moved into a new category. When a button for a verbal category was pressed, signalling a change in verbal interaction, the computer recorded that press and the time since the last change in verbal or nonverbal category and waited 1.0 second for a change in the nonverbal category. If no change occurred, the computer recorded the number of the nonverbal category currently in use. Similarly for changes in extraverbal interaction, the computer recorded the change and the time since the last button press and waited 1.0 second for a change in verbal interaction before recording the verbal category in use. Changes in verbal and extra-

verbal categories made within 1.0 second of each other were considered simultaneous changes.

The computer provided the following record punched onto paper-tape whenever a button was pressed: the verbal category number, the extra-verbal category number, and the time elapsed since the last coding move.

Observers were trained using the Consensus Coding (CONCODE) system (Sammel, Olson, & Weiske, 1972). This technique--an application of the CATT system--is set up so that two or more observers code the same behavioral episode on identical button boxes. When a tally is entered by one coder, the other coder must enter the same tally within a specified time limit. If he does not push the button within this interval or if his tally does not agree with that already entered, the computer stops the audio or video recording. Coders must then reach a consensus on the appropriate category and enter this tally before the computer will allow coding to continue. Such a procedure allows training of coders to be accomplished more quickly than by other means, since individual areas of confusion or disagreement are immediately apparent and must be resolved as they occur. Use of CONCODE in training of observers in the present study continued until coding of ten-minute training episodes was accomplished with fewer than five disagreements. A test episode of ten minutes duration was then introduced which was coded in all cases with fewer than five disagreements out of an average of 250 tallying moves.

Data analysis

The dependent measures of the study were the proportion of total time per task and proportion of the total number of transitions between

categories per task devoted to each of six types of interaction pattern: Orientation, Elaborated Explanation, Restricted Explanation, Elaborated Question-Response-Feedback, Restricted Question-Response-Feedback and Residual patterns. The first five patterns were selected to characterize a general teaching strategy in which the teacher first orients the learner to the general nature of the task, then provides a more detailed explanation of specific task requirements and finally elicits questions, provides answers and gets feedback from the learner to assure that the task is understood. This interaction may occur before work on the task commences or may take place as the individuals work. Elaborated patterns use linguistic means to communicate task requirements, whereas restricted patterns use more indefinite language to direct the learner's attention to the nonverbal activity of the teacher. Residual patterns are recurring sequences of categories which do not fit into the above five patterns but occur regularly enough to be called patterns.

Collet and Semmel (1970) demonstrated the independence of measures of time in category and number of transitions to and from a category by showing that, in a time-dependent system, changes in the length of the coding interval would result in changes in the frequency of "steady-state" tallies (which would approach the measure of time-in-category as coding interval size approaches zero) but would not affect the number of transitions from category to category. Thus, in order to provide a complete description of the coded data, both time and transitions must be examined. Differences in time in category reflect differences in the extent to which the interaction tends to remain in each category--a measure of

stability and of the dominance of one or more categories. The number of transitions to and from each category reflects the speed and diversity of the interaction. Although both aspects of the interaction are important, information about one of these measures does not provide knowledge of the other. In the present study the coding interval was zero (i.e., coding moves were made when the interaction changed) and the duration of each coding move was recorded. Hence, both measures of amount of time and number of transitions in patterns were examined for each hypothesis in order to make use of the two orthogonal data sources for interaction data.

Furthermore, it appeared necessary to apply different analysis procedures to time and transition data. Time in category has typically been referred to a normal distribution, and differences in proportion of time in categories have been analyzed by techniques related to the analysis of variance (Bobbitt, Gourevitch, Miller & Jensen, 1967; Flanders, 1970). In the present study, differences in the proportion of total time accounted for by specific patterns were examined by means of multiple correlation (Hypothesis 1), stepwise regression (Hypothesis 2), trend analysis (Hypothesis 3), planned comparisons of the differences between means (Hypotheses 4.A-D, 5.A-B, 6.A-B) (Hays, 1963) and analysis of variance (Hypotheses 4.E-F, 5.C, 6.C) techniques. Planned comparisons of means were selected to provide more powerful tests of some of the relatively specific hypotheses of the study than would be provided by overall analysis of variance (Hays, 1963, p. 475).

The measure of the number of transitions in patterns, as a frequency distribution, required techniques other than those used to examine time in patterns (Hays, 1963, p. 617). The differences in proportion of transitions in particular patterns were analyzed by means of Kendall's rank order correlation coefficient (τ) (Hypotheses 1,2) (Kendall, 1962), Wilcoxon's test of differences between two related samples (Hypothesis 3), log likelihood ratios based on an underlying multinomial distribution (Hypotheses 4.A-D, 5.A-B, 6.A-B) (Sprott & Kalbfleisch, 1965) and Mann-Whitney's U test for differences between two unrelated samples (Hypotheses 4.E-F, 5.C, 6.C) (Hays, 1963). The likelihood ratio test, introduced by Neyman and Pearson, "Involves the maximum likelihood of a particular sample result given the hypothesis H_0 relative to the maximum likelihood of the sample result over all possible values of the relevant parameters [Hays, 1963, p. 287]." The specific procedure applied in the present study is presented in Table 4.

It must be kept in mind, however, that the techniques used to analyze time and transition data do not answer exactly the same experimental questions.

The multiple correlation technique used to examine the proportion of time in patterns for the first hypothesis provides a parameter R which, when squared, indicates the proportion of variance in the time in pattern accounted for by the set of Cain-Levine subscale scores. The value of F derived from R tested the hypothesis that R^2 had some

TABLE 4

Summary Chart: Procedure for the
Likelihood Ratio Test of the Equivalence of Two Samples

$$H_0: P_{ij \text{ Gp. } k} = P_{ij \text{ Gp. } k}$$

$$H_a: P_{ij \text{ Gp. } k} \neq P_{ij \text{ Gp. } 1}$$

Alternate hypotheses being contrasted. Basic question: Likelihood that both sets of scores are from same distribution.

$$\hat{P}_{ij} = \frac{n_{ij}}{n_{..}}$$

Maximum likelihood estimate of probabilities.

$$L = \prod_{ij} (\hat{P}_{ij})^{n_{ij} \text{ Gp. } k}$$

Maximum likelihood formula.

$$\lambda = \frac{L}{L_0}$$

Maximum likelihood ratio: Ratio of maximum likelihoods of the obtained data under the two alternate hypotheses.

$$\ln \lambda = \frac{\sum_{ij} n_{ij \text{ Gp. } k} \ln \hat{P}_{ij \text{ Gp. } k}}{\sum_{ij} n_{ij \text{ Gp. } k} \ln \hat{P}_{ij \text{ Gp. } 1}}$$

Log likelihood ratio: Natural log of maximum likelihood ratio.

$$-2 \ln \lambda = \chi^2_{\text{Max. likelihood}}$$

Significance test (valid for relatively large N)

value other than zero against the null hypothesis that R^2 was zero.

Similarly, the stepwise regression used to examine the second hypothesis provides a series of regression equations expressing the predictability of proportion of time in patterns in terms of weighted values of the descriptive variables of the study. The "stepwise" feature of the technique refers to the fact that the descriptive variables are extracted in sequence in terms of the amount of predictability they add to the regression equation, with the best predictor extracted first, the variable providing the best two-parameter equation second and so on until all variables have been included in the equation.

The analysis of proportions of transitions in patterns for the first two hypotheses utilized Kendall's tau, a rank-order correlation coefficient. As a test of the degree of monotonicity of the relationship of two rankings of individuals, this technique uses only the ordinal rankings of scores. Through this procedure, the number of inversions in the rankings for pairs of individuals provides a measure of the degree of disagreement between the two measures in the way individuals are ranked.

The third hypothesis considers the differential effect of the experimental tasks on the interaction patterns used. Proportion of time in pattern was examined by trend analysis techniques which measure the extent to which a regression function for prediction of data has linear and/or quadratic components. The nature of this hypothesis required significant quadratic trends for support by predicting unequal

increases between tasks in the use of Explanation and Question-Response-Feedback patterns.

The change between tasks in the proportion of transitions devoted to these patterns was examined by means of Wilcoxon's T test for differences between two matched samples. In such a test, probability statements refer to a null hypothesis of exact equivalence of two population distributions of unspecified form.

The between-mother comparisons for Hypotheses 4, 5, and 6 were tested by means of planned comparisons for time data and by likelihood ratio tests for the data on proportion of transitions in patterns.

The planned comparison of group means provides a more powerful alternative to the overall analysis of variance when specific a priori questions are being asked about the differences between groups. When the experimental hypothesis specifies the direction of the anticipated difference, a t test of significance is used; when the experimental hypothesis is non-directional, F is used in the significance test. In any case, the basic question being asked is the same as that underlying the analysis of variance--to what extent are differences in scores attributable to treatment effects. Underlying both the planned comparison and analysis of variance techniques are the assumptions of homogeneity of variance for the experimental groups, normal distributions of scores and independence of observations. In order to satisfy the first assumption, researchers often apply an arcsine transformation to proportional data. Two points argue against this practice, however, except in extreme cases. First, the analysis of

variance is not greatly affected by moderate heterogeneity of variance, so that "transformations which have homogeneity of variance as their primary purpose are relatively less important than they were formerly considered to be [Winer, 1962, p. 219]." Second, a more positive reason for analyzing untransformed data is given by Scheffe (1959) in observing that interpretation of results and subsequent decisions about more detailed analyses may be difficult when data have been transformed. Because the results refer specifically to the transformed data, they may not be easily translatable into statements about the original observations. Thus, in the present study, although data were in the form of proportions, no transformation was applied.

In contrast to these methods by which the means and variances in data sets are compared, analysis of the transition data for the same hypotheses made use of the likelihood ratio technique. This method is not tied to any particular theoretical distribution. Rather, the researcher must specify the form of the distribution to which several parameter sets are being referred or he may specify alternate distributions to which a single data set may be fitted. In this study, the following procedure was used:

(1) It was assumed that the data on the proportion of transitions in patterns properly fit a multinomial probability distribution of the form:

$$m(n_1, n_2, \dots, n_k; N; p_1, p_2, \dots, p_k) = \frac{N!}{n_1! n_2! \dots n_k!} p_1^{n_1} p_2^{n_2} \dots p_k^{n_k} .$$

(2) The maximum likelihood estimates of $p_1, p_2, \dots, p_k$ are $\frac{n_i}{n_{..}}$ --The number of observations in class i divided by the total number of observations.

(3) The likelihood ratio test compared the two sets of data by providing two estimates of $p_1, p_2, \dots, p_k$, one from each of the groups being contrasted. The ratio of the two resulting multinomial equations which differ only in the values substituted for the probability estimates provides the measure of the likelihood that both sets of data represent the same distribution.

(4) In order to provide a link between this technique which is closely related to decision theory and the inferential statistics used in the other evaluations of data in the study, the value of λ , the maximum likelihood ratio, was transformed to $-2 \ln \lambda$ which is distributed as χ^2 with one degree of freedom in this study (Sprott & Kalbfleisch, 1965). Thus, an indicator of the significance level of the result is available.

The within-mother comparisons of Hypotheses 4,5, and 6 utilized an analysis of variance to examine differences in the proportion of time spent in specified patterns. As discussed earlier, this test is oriented to the question of the amount of variability in dependent measures that can be attributed to the effects of various independent variables both as main effects and in interaction with each other.

In contrast, within-mother differences in the proportion of transitions devoted to critical patterns were examined by a Mann-Whitney U test for the identity of two independent samples. The basic data for this test were the ranks of the differences in the proportion of transitions devoted to a pattern in each mother's interaction with her retarded child and with his sibling. The test compares the obtained distributions to all possible randomizations of the same samples among the experimental treatments. Again, as is the case with the Wilcoxon's T , probability state-

ments in this test refer to a null hypothesis that the distributions of the two populations are exactly equivalent.

In summary, this chapter has described the means by which the hypotheses presented in Chapter IV were tested. Included were the criteria for the selection of subjects and a description of the samples of mother-child pairs obtained, a description of the experimental tasks and of the data collection procedures, and a description of data analysis techniques. Analyses of proportion of time in specific patterns were by procedures which determine the amount of the variability in dependent measures which is attributable to the effects of the independent variables being manipulated. Analysis of proportion of transitions in patterns, however, was primarily by techniques which test for exact equivalence of the two distributions. Hence, "significant" results for time and transition data have some very real differences in meaning and must be interpreted with care.

CHAPTER VI

RESULTS

In this chapter, the analyses of data collected through procedures described in Chapter V are presented as evidence related to the hypotheses discussed in Chapter IV.

Independent variables were the interactive effects of the child's IQ and level of social competence, the effects of the verbal mediation requirements of each of the experimental tasks, and the ascribed role of the mother as teacher or learner. Dependent variables were the proportion of time and proportion of transitions accounted for by Orientation and by restricted and elaborated Explanation and Question-Response-Feedback patterns.

Each mother in the study was observed in interaction with two of her children--a Target child and a sibling of this child. Each Target child was a member of one of the three major experimental groups: The Control group (I) in which Targets were nonretarded children whose chronological age was from 4 through 6 years; the Younger Trainable group (II) in which Targets were trainable mentally retarded children whose chronological age was equivalent to that of Control Target children; and the Older Trainable group (III) in which Targets were trainable mentally retarded children whose measured level of social competence was equivalent to that of Control Target children. Siblings were either younger (subgroups I-A, II-A, III-A) or older (subgroups I-B, II-B, III-B) than Target children and were all nonretarded.

Three of the four experimental tasks--Block Stacking/Design Copying, Etch-A-Sketch, and Sorting/Magic Tricks--required that the mother communicate the requirements of the exercise to the child. The fourth task was designed in such a way that the role assigned the mother was one of allowing her child to teach her a simple skill. The experimental hypotheses consider separately the ascribed maternal role as teacher (Hypotheses 1-5) or learner (Hypothesis 6).

Hypotheses 1 and 2 consider the utility of measures of level of social competence as predictors of dyadic interactions.

Hypothesis 1 predicted a positive association of the mother's rating of her child's level of social competence and the use of elaborated patterns, within each IQ x CA group. In order to test this hypothesis, multiple correlation coefficients were used to ascertain the relationship of time in pattern to the four subscale scores for the measure of social competence used. Table 5 presents the data pertinent to this test. Hypothesis 1 is supported if the value of F obtained is greater than the critical value (7.39) for the .05 level of confidence with 4 and 5 degrees of freedom for the numerator and denominator. Table 6 presents the obtained values of R and F.

TABLE 6

Association of Time in Elaborated Patterns with Subscale Scores on the Cain-Levine Social Competency Scale: Multiple R and Values of F

Group	<u>R</u> _{1.2.3.4.5}	<u>F</u>
I (Control)	+0.669	1.0133
II (Younger TMR)	+0.468	0.3511
III (Older TMR)	+0.892	4.8770
<u>F</u> (.05,4,5) = 7.39		

TABLE 5
Correlations of Proportion of Time in Elaborated Patterns with
Cain-Levine Social Competency Scale Subscale Scores for Target Children

Group	Correlations									
	r_{12}	r_{13}	r_{14}	r_{15}	r_{23}	r_{24}	r_{25}	r_{34}	r_{35}	r_{45}
I (Control)	-.289	-.206	+.060	-.461	+.785	+.620	+.856	+.656	+.770	+.644
II (Younger TMR)	+.272	+.331	+.573	+.277	+.739	+.631	+.749	+.864	+.896	+.794
III (Older TMR)	+.392	-.124	-.034	+.089	+.521	+.406	+.039	+.850	+.715	+.792

Variable number	Variable name
1	Time in Elaborated Patterns
2	Cain-Levine: Communication Score
3	Cain-Levine: Social Skills Score
4	Cain-Levine: Initiative Score
5	Cain-Levine: Self-Help Score

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None of the obtained values of $R_{1.2.3.4.5}$ resulted in a value of F greater than that required for significance, hence the null hypothesis of no association of level of social competence and proportion of time in elaborated patterns could not be rejected.

Kendall's τ was used to examine the relationship of the proportion of transitions in elaborated patterns to the overall score on the level of social competence measure. Table 7 presents the results of this analysis.

TABLE 7

Results of Kendall's τ Analysis of Association of Proportion of Transitions in Elaborated Patterns with Cain-Levine Social Competency Scale Total Score

Group	τ	z	$P(X > z)$
I (Control)	-0.1348	-0.4490	0.6528
II (Younger TMR)	+0.1629	+0.5468	0.5824
III (Older TMR)	+0.2697	+0.9878	0.3220

The probabilities associated with the obtained values of τ were in all cases greater than .05. Accordingly, the null hypothesis of no association between the proportion of transitions in elaborated patterns and the perceived social competence of the child could not be rejected.

Hypothesis 2 predicted that the variable having the strongest correlation with maternal interaction patterns would be the mother's estimate of her child's level of social competence.

Hypothesis 2.A postulated that, in the total sample, scores on the Cain-Levine Social Competency Scale would better predict the proportion of interaction devoted to elaborated patterns than would the other descriptive measures used. Hypothesis 2.B made the same prediction for the dyadic interaction of mothers and trainable mentally retarded children (Groups II and III).

A stepwise regression program was employed to analyze the relative utility of various demographic measures and level of social competence scores in predicting the proportion of total time spent using elaborated and restricted interaction patterns during the three tasks which the mother taught the child. Results of this analysis for the total sample (Hypothesis 2.A) and for the mother-retarded child dyads (Hypothesis 2.B) are presented in Table 8. Support for the hypothesis would be indicated by extraction of the Cain-Levine subscale and total scores in the initial steps of the regression procedure. Examination of the data from Table 8 does not indicate superiority of the measures of level of social competence (Cain-Levine scores) over descriptive and demographic variables as predictors of the proportion of interaction time devoted to elaborated patterns in the total sample. Comparison of results for the mother-retarded child dyads to those for all dyads does appear to indicate some greater utility of the Cain-Levine scores as predictors of the use of elaborated and restricted patterns by mothers and trainable children. In particular, use of restricted patterns by mothers and older retarded children (Group III) and use of both elaborated and restricted patterns by mothers and younger retarded children (Group II) were predicted better by Cain-Levine scores

TABLE 8

Multiple Correlation Coefficients for Each Stage of
Stepwise Regression Analysis of the Association of
Descriptive Variables and Proportion of Time in Elaborated
and Restricted Patterns

Step	<u>Elaborated</u>			<u>Restricted</u>		
	Total group (n=60)	Young TMR (n=10)	Older TMR (n=10)	Total group (n=60)	Young TMR (n=10)	Older TMR (n=10)
1	A(.3687)	H(.5734)	D(.6433)	C(.3465)	G(.4781)	E(.4314)
2	B(.4429)	A(.7151)	C(.7165)	H(.3973)	C(.6513)	C(.5156)
3	D(.4695)	E(.7574)	G(.7765)	D(.4053)	F(.7616)	F(.5614)
4	G(.4804)	D(.9030)	A(.8043)	B(.4082)	H(.8418)	G(.6538)
5	H(.5438)	I(.9277)	H(.8627)	F(.4095)	B(.8867)	D(.8485)
6	E(.5534)	C(.9326)	E(.8808)	G(.4116)	D(.9427)	A(.9473)
7	C(.5620)	B(.9426)	F(.9230)	A(.4135)	A(.9431)	H(.9632)
8	I(.5728)	F(.9505)	B(.9340)	I(.4138)	E(.9431)	B(.9656)
9	F(.5798)	G(.9611)	I(.9472)	E(.4636)	I(.9516)	I(.9783)

VariableVariable name

A
B
C
D
E
F
G
H
I

Chronological age
Highest education of mother
Highest education of father
Number of children in family
Cain-Levine: Communication score
Cain-Levine: Social Skills score
Cain-Levine: Self Help score
Cain-Levine: Initiative score
Cain-Levine: Total score

in that three of the five scores were extracted in the first five steps.

The association of values of the descriptive variables with the proportion of transitions in elaborated and restricted patterns was measured by means of Kendall's tau. The obtained values of this rank-order correlation coefficient and the associated values of z are presented in Table 9. Examination of the results indicates no significant correlation of descriptive variables with use of elaborated or restricted patterns in the interaction of mothers and trainable retarded children. In the total sample, however, a number of significant correlations were present. Significant positive correlations of proportion of transitions devoted to elaborated patterns with mother's educational level and with father's educational level were found. Correlations of the proportion of transitions devoted to elaborated patterns with the child's chronological age, the number of children in the family, and with scores on the Cain-Levine Self-Help subscale were significant, but negative, as were the correlations of the use of restricted patterns with maternal and paternal educational levels.

Hypothesis 3 predicted differences in the relative use of Explanation and Question-Response-Feedback patterns across the three tasks that the mother was asked to teach as a function of the kinds of verbal mediation required by the tasks.

The experimental tasks were chosen to elicit different kinds of teaching strategies from the mother. The Block-Stacking task was seen as requiring verbal orientation to the nature of the task only; all

TABLE 9

Results of Kendall's Tau Analysis of Association of Descriptive Variables with Proportion of Transitions in Broad and Narrow Patterns

Variable	<u>Total sample</u>		<u>Trainable dyads</u>	
	Broad	Narrow	Broad	Narrow
CA	T: -0.2287 Z: -2.5091*	0.0874 0.9761	-0.1952 -1.1462	0.0422 0.2272
M. educ.	T: 0.2582 Z: 2.6682*	-0.2124 -2.2433*	0.1141 0.6135	-0.1695 -0.9464
F. educ.	T: 0.2135 Z: 2.1948*	-0.2878 -3.0283*	0.1635 0.9034	-0.1762 -0.9954
#child	T: -0.2070 Z: -2.0444*	0.1696 1.7118	0.2781 1.5301	0.0765 0.4047
CL-C	T: -0.0235 Z: -0.2388	-0.0234 -0.2434	0.1429 0.8211	0.2086 1.2374
CL-SS	T: -0.1151 Z: -1.2439	0.0271 0.2940	0 0	0.1005 0.5846
CL-I	T: -0.1295 Z: -1.3933	0.0440 0.1955	0.1157 0.6575	0.0375 0.4798
CL-SH	T: -0.1941 Z: -2.1123*	0.0389 0.4279	-0.0221 -0.0986	0.0628 0.3585

* $p(|X| \geq Z) < .05$

<u>Variable abbreviation</u>	<u>Variable name</u>
CA	Chronological age
M. educ.	Highest education of mother
F. educ.	Highest education of father
#child	Number of children in family
CL-C	Cain-Levine: Communication score
CL-SS	Cain-Levine: Social Skills score
CL-I	Cain-Levine: Initiative score
CL-SH	Cain-Levine: Self-Help score

other aspects of the task could be demonstrated nonverbally. The Etch-A-Sketch task required that the mother orient the child to the task and also that she provide specific verbal direction of his responses in their cooperative effort at copying the designs. The third task taught by the mother--the Sorting task--was seen as requiring the most complex interaction. In addition to the necessity for orientation and direction by the mother, optimal performance on the task required the mother to assure that the child understood the relevant dimensions for sorting the objects. Some evidence supporting this hierarchy of difficulty can be seen in the amount of time that mother-child dyads required to complete each task. The Block Stacking task required the least amount of time ($\bar{X}$ = 200.2 sec., range = 26.7-324. sec.), the Etch-A-Sketch task was second ($\bar{X}$ = 431.5 sec., range = 138.9-660.2 sec.), and the Sorting task required the greatest amount of time ($\bar{X}$ = 481.7 sec.), although the range encompassed that for the Etch-A-Sketch task (range = 126.8-921.5 sec.).

Data on the proportion of time in patterns was analyzed by trend analysis techniques. The hypothesis is supported if quadratic trends in the effect of Tasks are significant. Proportion of transitions in patterns was analyzed by means of Wilcoxon's test for the difference of two related means.

In Hypothesis 3.A, the use of Question-Response-Feedback patterns was expected to be greater for Etch-A-Sketch than for Sorting. It was predicted that this difference would be greater than would the difference resulting from an expected greater use of Question-Response-Feedback

patterns during Block Stacking than during Etch-A-Sketch. The mean proportion of time in Question-Response-Feedback patterns in the three tasks taught by the mother are presented in Figure 1. The results of the trend analysis of proportion of time in Question-Response-Feedback patterns are presented in Table 10. Linear effects of tasks for Target dyads in all groups were greater than the values required for significance at the .05 level. Quadratic effects were significant and in the predicted direction for the Control group (I) only, however. Examination of data for mothers and siblings of Target children indicated that the use of Question-Response-Feedback patterns for mothers and siblings of retarded children was much more similar to these mothers' use of Question-Response-Feedback patterns with retarded children than to the use of these same patterns by mothers and children in the Control group. Mothers in the Control group showed similar use of Question-Response-Feedback patterns with both Target children and their siblings.

Figure 2 presents the mean proportion of transitions in Question-Response-Feedback patterns in each of the three tasks taught by the mother. The analysis of the proportion of transitions in Question-Response-Feedback patterns resulted in a value of Wilcoxon's T for the Control dyads which was significant at the .01 level ($T=0$; $z=2.81$; $p<.01$). The prediction was not supported for the two retarded groups because, in both cases, there were more dyads for whom the increase in Question-Response-Feedback patterns from Sorting to Etch-A-Sketch tasks was less than the increase from Etch-A-Sketch to Block Stacking task.

Figure 1

Mean Proportion of Time in Question-Response-Feedback
Patterns in Tasks Taught by Mother (n=10).

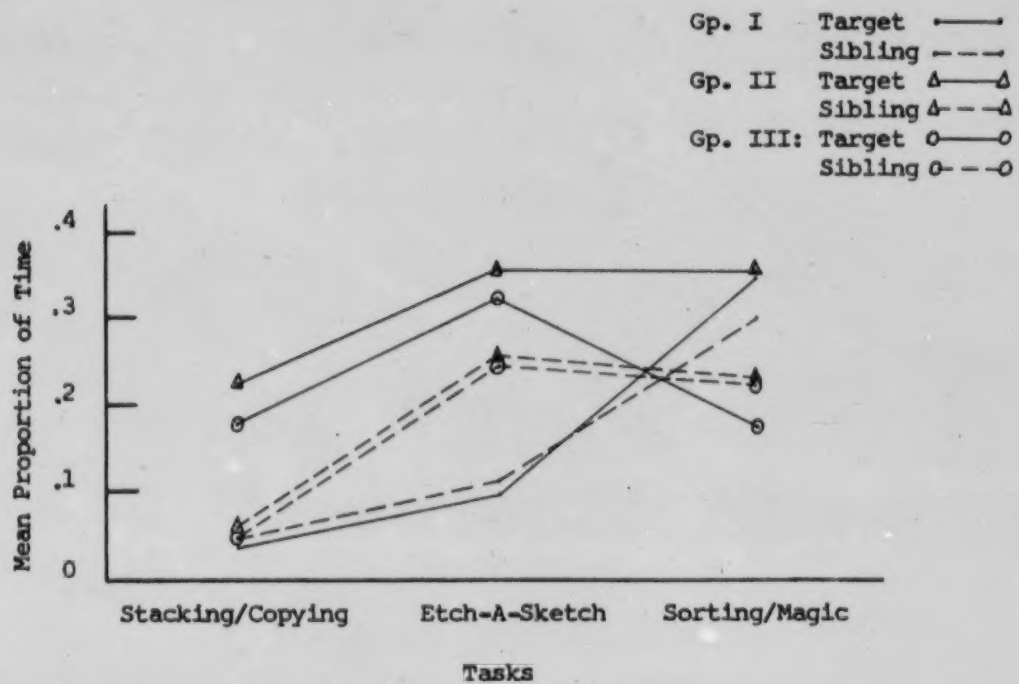


Figure 2

Mean Proportion of Transitions in Question-Response-
Feedback Patterns in Tasks Taught by Mother (n=10).

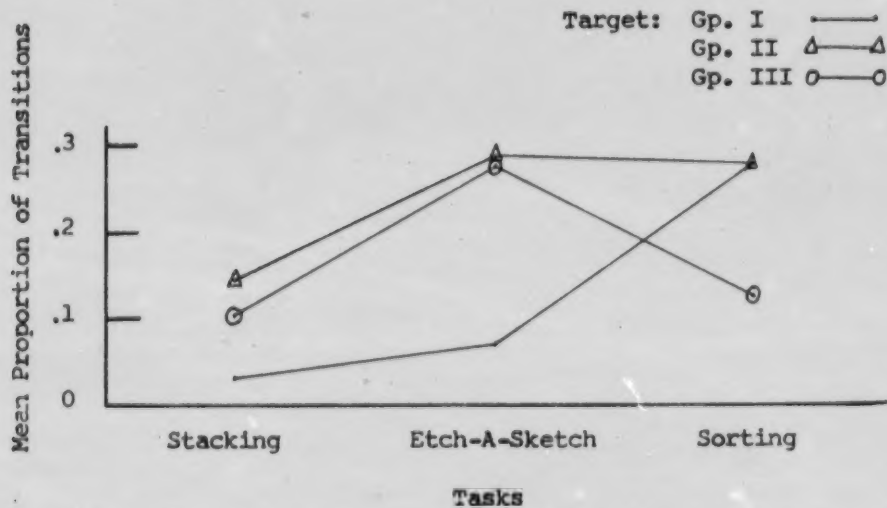


TABLE 10
Summary of Trend Analysis on Data for Proportion of Time in
Question-Response-Feedback Patterns for Two Factors: Position
of Child (Target or Sibling) and Tasks (Taught by Mother)

Source	df	Young TMR/sib		Older TMR/sib		Control/sib	
		MS	F	MS	F	MS	F
Between $\bar{S}s$	9						
Within $\bar{S}s$	50						
Position (Target: Sib)	1						
Position x $\bar{S}s$	9						
Tasks	2						
Linear	1	0.21389	6.7303*	0.06796	5.45863*	0.80861	62.34464**
Quadratic	1	0.11979	1.6249	0.24636	7.75449*	0.07861	6.71324*
Tasks x $\bar{S}s$	18						
Linear	9	0.03178		0.01245		0.01297	
Quadratic	9	0.07372		0.03177		0.01171	
Position x Tasks	2						
Linear	1	0.00222	0.1129	0.08407	4.72569	0.00851	0.73362
Quadratic	1	0.00605	0.2558	0.00367	0.10900	0.00246	0.42760
Position x Tasks x $\bar{S}s$	18						
Linear	9	0.01970		0.01779		0.01160	
Quadratic	9	0.02364		0.03368		0.00576	

* $F_{(1,9)}(.05) = 5.12$

** $F_{(1,9)}(.01) = 10.56$

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Hypothesis 3.B predicted a greater use of Explanation patterns for Etch-A-Sketch than for Block Stacking and for Sorting than for Etch-A-Sketch. The difference was expected to be greater for the Etch-A-Sketch/Block Stacking comparison than for the Etch-A-Sketch/Sorting comparison.

The mean proportions of time devoted to Explanation patterns in these three tasks are presented in Figure 3. Table 11 presents the summary of the trend analysis of proportion of time in Explanation patterns across the three tasks taught by the mother. This analysis revealed significant linear trends for the groups of dyads containing retarded children (Groups II & III). Quadratic trends were not significant for these groups, and neither linear nor quadratic trends were significant for the Control group Target dyads (Group I). Hence the null hypothesis could not be rejected.

The mean proportions of transitions in Explanation patterns in the three tasks are presented in Figure 4. Analysis of differences in the proportion of transitions accounted for by Explanation patterns revealed that for all three groups of Target dyads, more than half of the dyads showed greater increases in the use of Explanation patterns between the Etch-A-Sketch and Sorting tasks than between the Block Stacking and Etch-A-Sketch tasks. Thus, the null hypothesis of equivalence of the occurrence of Explanation patterns across tasks could not be rejected.

In summary, some support for the hypothesized differences in the types of verbal mediation required by the maternal teaching tasks was

Figure 3

Mean Proportion of Time in Explanation Patterns
in Tasks Taught by Mother (n=10).

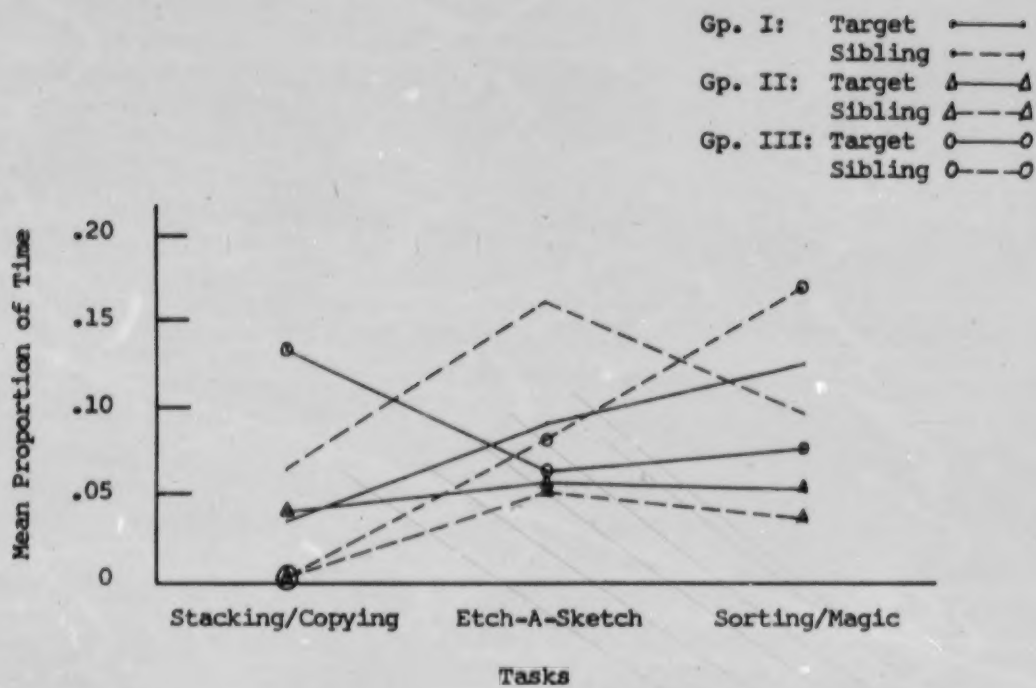


Figure 4

Mean Proportion of Transitions in Explanation
Patterns in Tasks Taught by Mother (n=10).

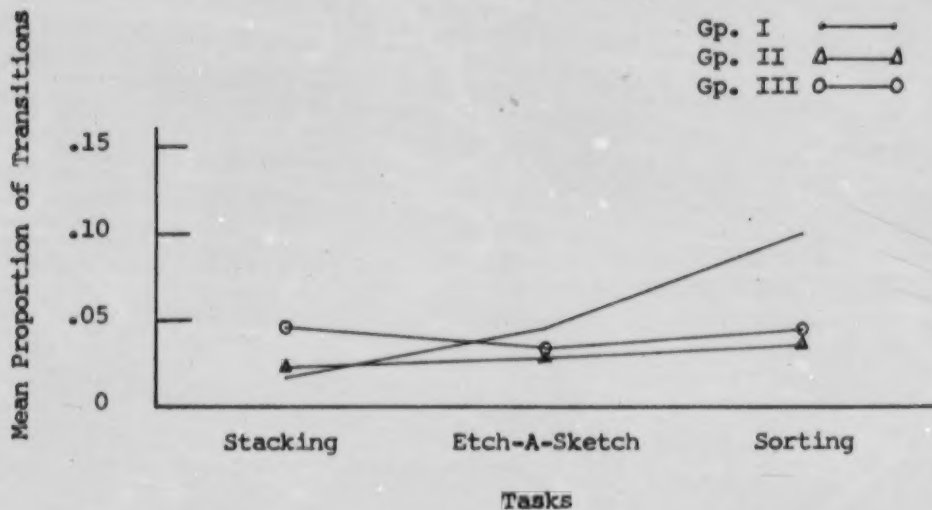


TABLE 11
Summary of Trend Analysis on Data for Proportion of Time in Explanation Patterns
for Two Factors: Position of Child (Target or Sibling) and Tasks (Taught by Mother)

Source	df	Young TMR/sib		Older TMR/sib		Control/sib	
		MS	F	MS	F	MS	F
Between <u>Ss</u>	9						
Within <u>Ss</u>	50						
Position (Target: Sib)	1						
Position x <u>Ss</u>	9						
Tasks	2						
Linear	1	0.00797	6.3254*	0.034940	6.6049*	0.04139	3.68895
Quadratic	1	0.009085	1.4307	0.006631	0.4388	0.02451	0.94197
Tasks x <u>Ss</u>	18						
Linear	9	0.00126		0.00529		0.01122	
Quadratic	9	0.00635		0.01511		0.02602	
Position x Tasks	2						
Linear	1	0.00097	0.86607	0.12708	8.6332*	0.00773	0.68554
Quadratic	1	0.001343	0.1724	0.005127	0.7283	0.02085	1.44398
Position x Tasks x <u>Ss</u>	18						
Linear	9	0.00112		0.01472		0.01127	
Quadratic	9	0.00779		0.00704		0.01444	

* $F_{(.05,1,9)} = 5.12$

** $F_{(.01,1,9)} = 10.56$

147, 148

provided by the data. Significant quadratic trends across tasks in the use of Question-Response-Feedback patterns were observed for the Control dyads and dyads of mothers and Older trainable retarded children with respect to time in patterns and for the Control group only with respect to number of transitions in patterns. No significant quadratic trends were observed for time or transition data in the use of Explanation patterns.

Hypothesis 4 was concerned with the effects of the child's IQ and level of social competence upon the use of broad (elaborated) and narrow (restricted) patterns. Hypotheses 4.A through 4.D were tested by means of planned comparisons of the mean time in pattern and likelihood ratio techniques for the transitions in pattern. The data necessary for evaluation of Hypotheses 4.A-D in terms of proportion of time in patterns are presented in Figures 5 and 6. Data for analyzing proportion of transitions in patterns is presented in Figures 7 and 8.

Hypothesis 4.A predicted that mothers interacting with nonretarded children (Group I) would use a greater proportion of elaborated patterns than would mothers interacting with moderately retarded children of equivalent chronological age (Group II) or level of social competence (Group III). Hypothesis 4.B further predicted that mothers interacting with trainable retarded children (Group III) whose measured level of social competence was equivalent to that of the nonretarded Target children in the study would devote a greater proportion of their interaction to the use of broad patterns than would mothers interacting with trainable retarded children (Group II) whose chronological age was

Figure 5

Mean Proportion of Time in Elaborated and Restricted Patterns for Dyads Containing Retarded and Nonretarded Target Children ($n_{TMR}=20$, $n_{Control}=10$).

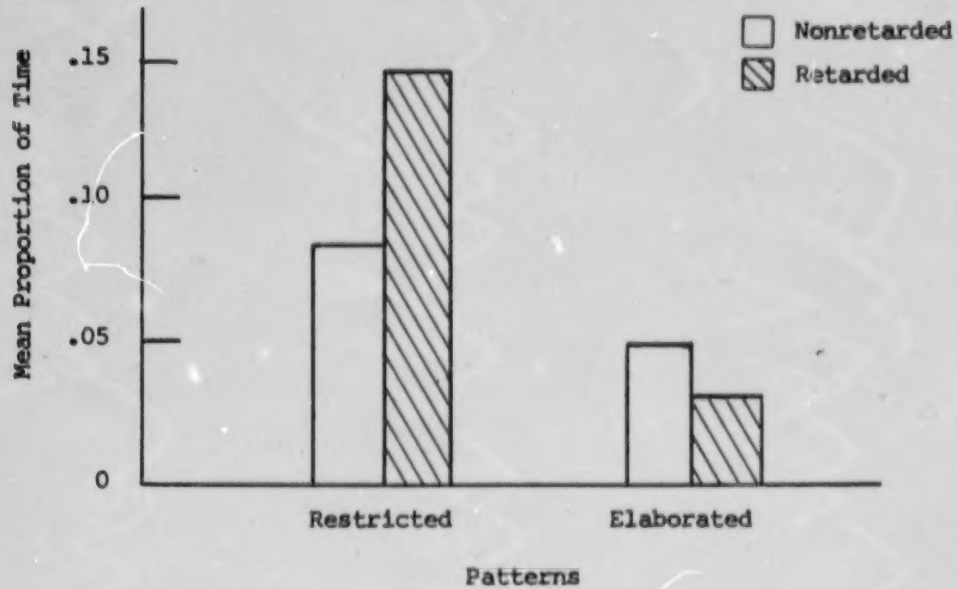


Figure 6

Mean Proportion of Time in Elaborated and Restricted Patterns for Dyads Containing Younger and Older Retarded Children ($n=10$).



Figure 7

Mean Proportion of Transitions in Elaborated and Restricted Patterns for Dyads Containing Retarded and Nonretarded Target Children ($n_{TMR}=20$, $n_{Control}=10$).

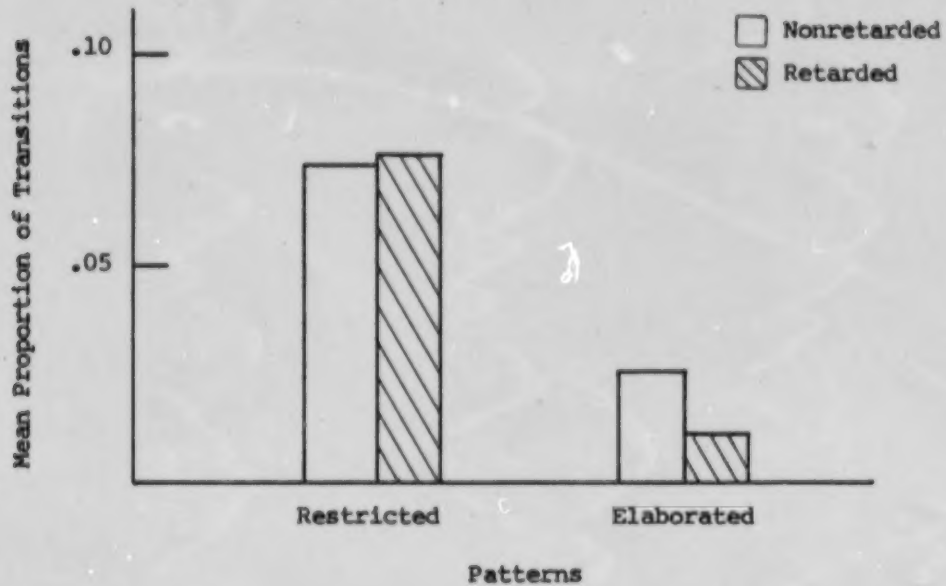
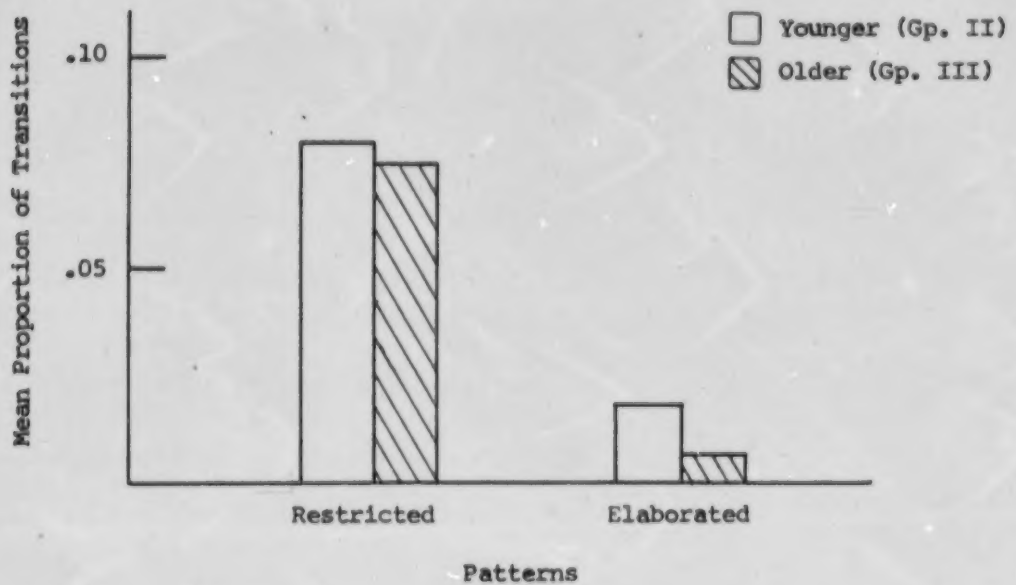


Figure 8

Mean Proportion of Transitions in Elaborated and Restricted Patterns for Dyads Containing Younger and Older Retarded Children ($n=10$).



equivalent to that of the nonretarded Target sample.

The planned comparisons of proportion of time spent in elaborated patterns resulted in values of t (Hypothesis 4.A: $t = 0.9382$; Hypothesis 4.B: $t = 0.08764$) which were smaller than the critical value of 1.697 required for significance at the five percent level of confidence.

The likelihood ratio comparisons of the proportion of transitions devoted to elaborated patterns provided highly significant values of $-2 \ln \lambda$, which is approximately distributed as χ^2 (Hypothesis 4.A: $\chi^2_{nl} = 195.956$; Hypothesis 4.B: $\chi^2_{nl} = 127.678$; critical value: $\chi^2_{(1, .001)} = 10.828$). These values of χ^2 indicate that it is highly unlikely that scores of the two groups represent the same population.

In Hypothesis 4.C, the prediction was that mothers working with nonretarded children (Group I) would devote a smaller proportion of the interaction to the use of restricted patterns than would mothers working with trainable mentally retarded children of the same chronological age (Group II) or level of social competence (Group III). Hypothesis 4.D postulated a difference between mothers interacting with Younger (Group II) and Older (Group III) moderately retarded children in which the use of restricted patterns was greater for dyads of mothers and younger retarded children.

The analysis of data relevant to Hypothesis 4.C resulted in a value of t (3.225) greater than that required for significance at the .05 level of confidence when the mean proportions of time in narrow patterns were compared for the two subject groups. Comparison of the relative likelihood of the proportion of transitions spent in narrow patterns by

these two groups did not reveal significant differences, however ($\chi^2_{ns} = 0.87656$; $\chi^2_{(1,.05)} = 3.841$).

Planned comparisons of the difference in the mean proportions of time in restricted patterns used to test Hypothesis 4.D were not significant ($t = 1.028$; $t_{.05,30} = 1.697$). The relative likelihood of the distributions of the proportions of transitions in narrow patterns yielded a value of 7.904, greater than that required for significance at the .005 level of confidence ($\chi^2_{(1,.005)} = 7.879$).

Parts E and F of Hypothesis 4 compared the interaction of mothers with their trainable retarded children (Groups II & III) to the interaction of the same mothers with one of their nonretarded children.

In Hypothesis 4.E it was predicted that there would be a greater difference in the proportion of interaction accounted for by elaborated patterns when the interaction of mothers with retarded children and with older nonretarded siblings of these children (Groups II-B, III-B) were compared than when the interaction of mothers with retarded children and with younger nonretarded siblings of these children (Groups II-A, III-A) were compared. Analysis of the difference in the proportion of time devoted to elaborated patterns was by means of a $2 \times 2 \times 3$ analysis of variance in which the factors represented chronological age group of the retarded child, relative age of the nonretarded sibling (older or younger) and tasks (the three tasks taught by the mother)--a repeated measures factor. The summary for this analysis is presented in Table 12. The effect of relative age was not significant ($F = 0.5516$, $df = 1,16$, $p > .05$), hence the null hypothesis of no difference between the two

TABLE 12

Summary of Analysis of Variance on Data for Proportion of Time
in Elaborated Patterns for Experimental Groups on Three Factors:
Age Group, Position of Child (Target or Sibling) and Tasks (Taught by Mother).

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	F
Between <u>Ss</u>	0.306059	19	0.016108	0.8748
A (Age group of TMR)	0.000667	1	0.000667	0.0362
B (Sibling: Younger or Older)	0.010156	1	0.010156	0.5516
AB	0.000626	1	0.000626	0.0340
<u>Ss</u> wi/ Groups	0.294610	16	0.018413	
Within <u>Ss</u>	0.506916	40	0.012673	0.9290
C (tasks)	0.038708	2	0.019354	1.4188
AC	0.009361	2	0.004681	0.3432
BC	0.003858	2	0.001029	0.0754
ABC	0.018477	2	0.009239	0.6773
C x <u>Ss</u> wi/ Groups	0.436512	32	0.013641	
$F_{(.05, 2, 32)} = 3.32$				

groups could not be rejected. Analysis of the differences in proportions of transitions accounted for by broad patterns was accomplished by means of the Mann-Whitney $\underline{U}$ test for the equivalence of two independent samples. Values used in this test are presented in Table 13.

Table 13

Mann-Whitney $\underline{U}$ Test Comparison of Differences in Mothers' Interaction with Retarded Target Children and with Younger vs. Older Siblings.

	Narrow Patterns	Mother: Teacher		Mother: Learner
		Broad Patterns	Orientation Patterns	Maternal Patterns
$\underline{N}_1$	10	10	10	10
$\underline{N}_2$	10	10	10	10
$\underline{T}_1$	84	102.5	107	98
$\underline{U}$	52.5	71	48	57
$\underline{U}'$	47.5	29		43

$$\underline{U}_{\text{critical}} = 27$$

$$p(\underline{U} < \underline{U}_{\text{critical}}) \leq .05$$

$$\underline{U} = \underline{N}_1 \cdot \underline{N}_2 - \frac{\underline{N}_1(\underline{N}_1 + 1)}{2} - \underline{T}_1$$

$$\underline{U}' = \underline{N}_1 \cdot \underline{N}_2 - \underline{U} \quad (\text{used when } \underline{U} > \underline{N}_1 \cdot \underline{N}_2 / 2)$$

$\underline{T}_1$ = ranks in one group

$\underline{N}_1$ = number of mothers working with retarded children and younger siblings

$\underline{N}_2$ = number of mothers working with retarded children and older siblings

Support for the experimental hypothesis required that the value of U be less than or equal to 27. The obtained value of $\underline{U}$ ($U=47.5$) was greater than the critical value of $\underline{U}$, hence the null hypothesis that the two groups of scores came from the same population could not be rejected.

Hypothesis 4.F predicted a greater difference in the use of narrow patterns when the interaction of mothers with trainable retarded children was compared with the interaction with older siblings of these children (Groups II-B, III-B) than when the interaction of mothers with trainable retarded children was compared with their interaction with younger siblings of these children (Groups II-A, III-A). A $2 \times 2 \times 3$ analysis of variance with repeated measures on the last factor was used to examine the data on the proportion of time devoted to narrow patterns. The factors were chronological age group, relative age of sibling (younger or older than retardate), and task (one of three taught by the mother). The summary of this analysis is presented in Table 14. The main effect of factor B (younger vs. older sibling) was significant at the .05 level of confidence ($F=6.830$), thus permitting rejection of the null hypothesis of equivalence of the two groups. The mean difference of the proportion of time in restricted patterns was greater for Groups II-B and III-B ($\bar{X} = -0.168$) than for Groups II-A and III-A ($\bar{X} = 0.027$); hence, the difference between these groups was in the predicted direction. Table 13 presents values used in the Mann-Whitney $\underline{U}$ test which compared the differences in proportions of transitions for the two groups. The obtained value of $\underline{U}$ ($U=29$) was greater than the critical value ($U=27$) required

TABLE 14

Summary of Analysis of Variance on Data for Proportion of Time
in Restricted Patterns for Experimental Groups on Three Factors:
Age Group, Position of Child (Target or Sibling) and Tasks (Taught by Mother).

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
<u>Between Ss</u>	2.152616	19	0.113296	1.3687
A (Age group of TMR)	0.0141659	1	0.0141659	0.1711
B (Sibling: Younger or Older)	0.565355	1	0.565355	6.8298*
AB	0.121158	1	0.121158	1.4636
<u>Ss wi/ groups</u>	1.324444	16	0.082778	
<u>Within Ss</u>	2.810056	40	0.070251	1.1760
C (tasks)	0.536979	2	0.268490	4.4945*
AC	0.251063	2	0.125532	2.1014
BC	0.074929	2	0.037465	0.6272
ABC	0.035477	2	0.017739	0.2969
C x <u>Ss wi/ groups</u>	1.911608	32	0.059738	

$$\underline{F}_{(.05,2,32)} = 2.32$$

$$\underline{F}_{(.05,1,16)} = 4.49$$

$$* \underline{p} < .05$$

for significance. Hence the null hypothesis could not be rejected for the transition data.

In summary, the six parts of Hypothesis 4 examined the differences in the use of elaborated and restricted patterns during the three maternal teaching tasks by mother-child dyads of the three groups in the study. Part 4.A, comparing the interaction of mothers and nonretarded Target children to the interaction of mothers and trainable retarded children of equivalent chronological age or level of social competence with respect to the use of elaborated patterns, was strongly supported by data on transitions but not by data on time in patterns, as shown in Figures 5 and 7. Hypothesis 4.C., comparing the same dyads on the proportion of interaction accounted for by restricted patterns, was supported by data on time in patterns but not by data on number of transitions in patterns. Part 4.B compared the use of elaborated patterns by mothers with young trainable children to the use of these patterns by mothers with older trainable children and was strongly supported by data on transitions in patterns but not by data on time in patterns, as shown in Figures 6 and 8. Comparison of the proportion of time devoted to restricted patterns by these two groups in part 4.D was supported by transition data but not by time in patterns. Parts E and F of the fourth hypothesis examined differences in the dyadic interaction of mothers with trainable retarded children and with non-retarded siblings of these children. The prediction made was that the difference in interaction would be greater between retarded children and older siblings than between trainable children and younger siblings.

Hypothesis 4.E., dealing with use of elaborated patterns, was not supported by time or transition data, as shown in Tables 12 and 13. Hypothesis 4.F, examining use of restricted patterns, was supported by time data but not by transition data (Tables 13 and 14).

Hypothesis 5 considered the effects of the perceived capability of the child upon the amount of interaction devoted to the use of Orientation patterns by the mother.

Hypothesis 5.A predicted that mothers interacting with nonretarded children would make more use of Orientation patterns than would mothers interacting with moderately retarded children of the same chronological age or level of social competence. Differences in the mean proportions of time in Orientation patterns for retarded and nonretarded dyads were examined by a planned comparison. The data used in this test are presented in Figure 9. The obtained value of t (0.2900) was less than that required for rejection of the null hypothesis ($t_{.05,30}=1.697$).

The distributions of the proportions of transitions in Orientation patterns for the two groups were compared by means of a likelihood ratio test. The data for this test are presented in Figure 10. Under the hypothesis that the true probabilities were those obtained in dyads of mothers and nonretarded Target subjects (Group I), the likelihood of the obtained proportions of transitions for dyads of mothers and retarded children was sufficiently small to result in a value of χ^2 of 9.816, which was greater than that required for significance at the .005 level of confidence ($\chi^2_{(1,.005)}=7.879$). Hence, the null hypothesis of equivalence of the two distributions was rejected. The difference

Figure 9

Mean Proportion of Time in Orientation Patterns for Dyads Containing Retarded and Nonretarded Target Children ($n_{\text{TMR}}=20$, $n_{\text{Control}}=10$).

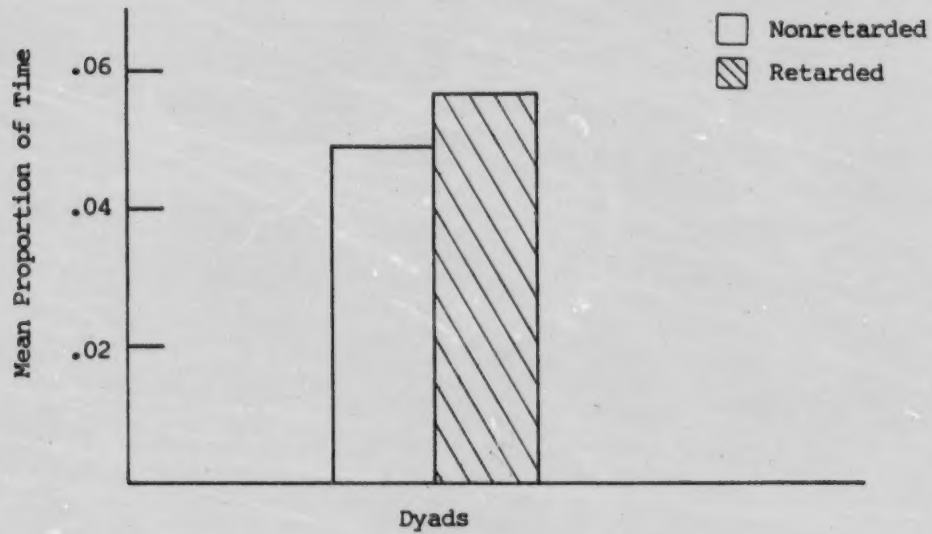
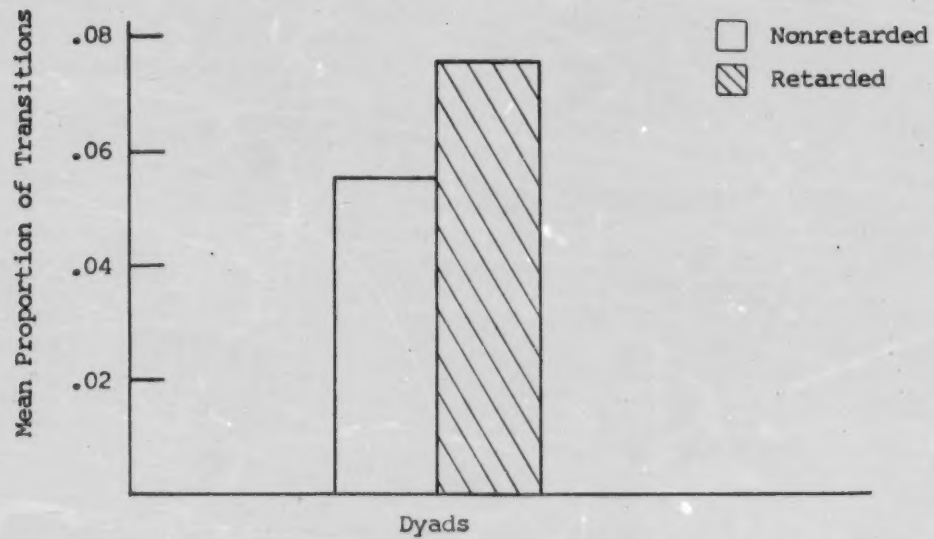


Figure 10

Mean Proportion of Transitions in Orientation Patterns for Dyads Containing Retarded and Nonretarded Target Children ($n_{\text{TMR}}=20$, $n_{\text{Control}}=10$).



was not in the predicted direction, however, since mothers working with retarded children devoted a greater proportion of transitions to Orientation patterns than did mothers working with nonretarded Target children.

Hypothesis 5.B predicted greater use of Orientation patterns by mothers interacting with older moderately retarded children than by mothers interacting with younger moderately retarded children.

The planned comparison of the mean proportions of time in Orientation patterns for these groups was based on data presented in Figure 11 and resulted in a value of t which was too small for significance at the .05 level ($t = -0.7608$; $t_{(.05,30)} = 1.697$).

The comparison of the distribution of the proportions of transitions in Orientation patterns for the two groups of retarded subjects was based on data presented in Figure 12 and yielded a log likelihood ratio of -0.0714 and a value of $\chi^2 = 0.1428$. This value is less than the value ($\chi^2 = 3.841$) required for significance at the .05 level of confidence. Hence, the null hypothesis of equivalence of the two groups could not be rejected for either proportion of time or proportion of transitions in Orientation patterns.

In Hypothesis 5.C it was predicted that there would be a greater difference in the proportion of interaction accounted for by Orientation when the interaction of mothers with trainable retarded children was compared to the interaction of the same mothers with older nonretarded siblings of these children (Group II-B, III-B) than when the interaction of mothers with trainable children was compared to the interaction of the same mothers with younger nonretarded siblings of these children

Figure 11

Mean Proportion of Time in Orientation Patterns for Dyads
Containing Younger and Older Retarded Children ($n=10$).

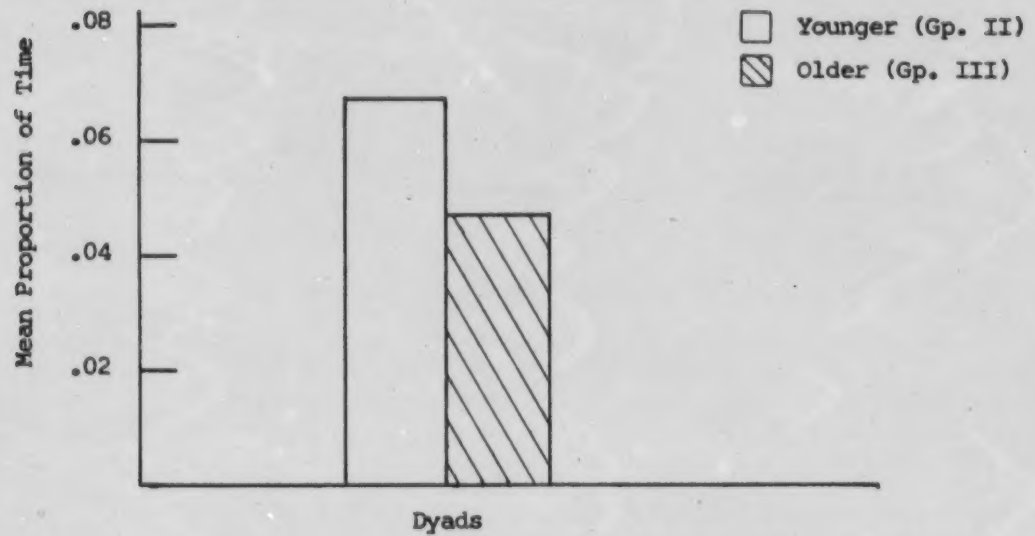
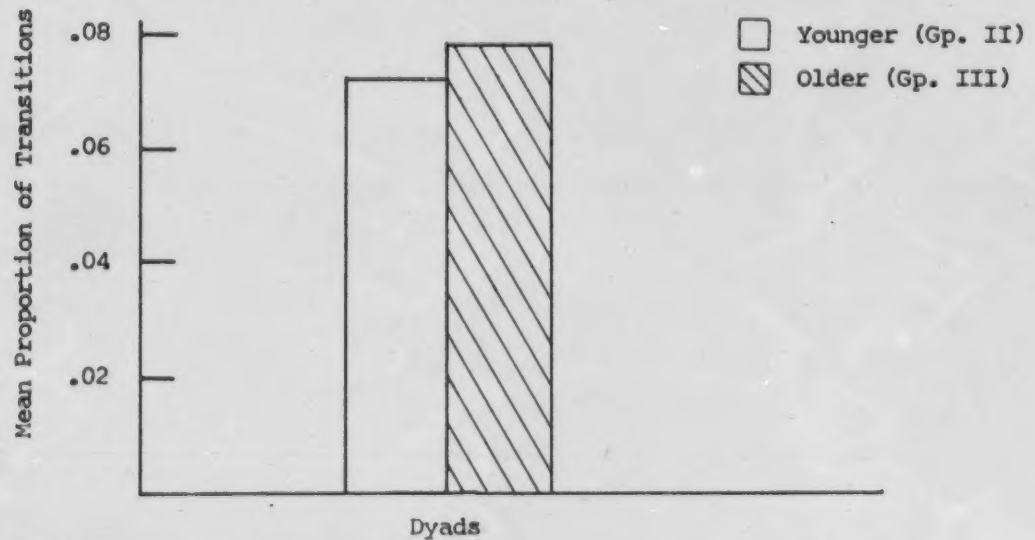


Figure 12

Mean Proportion of Transitions in Orientation Patterns for Dyads
Containing Younger and Older Retarded Children ($n=10$).



(Groups II-A, III-A). The analysis of data on the proportion of time in Orientation patterns utilized a $2 \times 2 \times 3$ analysis of variance with repeated measures on the third factor. The summary of this analysis is presented in Table 15. The value of F for factor B (younger vs. older sibling) was not significant, hence the null hypothesis was not rejected.

The proportion of transitions in Orientation patterns was analyzed by means of a Mann-Whitney U test. Data for this test are presented in Table 13. The obtained value of U (48) was greater than that required for significance at the .05 level ($U_{.05} = 27$). Hence, the null hypothesis of equivalence of the two sample distributions could not be rejected.

In summary, the prediction of greater use of Orientation by mothers interacting with nonretarded preschool children than by mothers interacting with retarded children of equivalent chronological age or level of social competence was not supported by data on the proportion of time in these patterns but was strongly supported by comparisons of the proportions of transitions in Orientation patterns. Contrary to prediction, mothers working with older trainable children did not devote a greater proportion of time or transitions to Orientation patterns than did mothers working with younger trainable children. The anticipation that there would be greater differences in the use of Orientation by mothers working with trainable children and older siblings than by mothers working with trainable retarded children and younger siblings was, similarly, without support from the data.

TABLE 15

Summary of Analysis of Variance on Data for Proportion of Time
in Orientation Patterns for Experimental Groups on Three Factors:
Age Group, Position of Child (Target or Sibling) and Tasks (Taught by Mother).

Sources	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
Between <u>Ss</u>	0.389677	19	0.020509	0.9913
A (Age group of TMR)	0.029521	1	0.029521	1.4268
B (Sibling: Younger or Older)	0.009741	1	0.009741	0.4708
AB	0.019372	1	0.019372	0.9363
<u>Ss</u> wi/ groups	0.331043	16	0.020690	
Within <u>Ss</u>	0.213130	40	0.005328	0.9586
C (tasks)	0.014585	2	0.007293	1.3122
AC	0.004829	2	0.002415	0.4345
BC	0.014446	2	0.007223	1.2996
ABC	0.001421	2	0.000711	0.1279
C x <u>Ss</u> wi/ groups	0.177849	32	0.005558	
$F_{(.05,2,32)} = 2.32$				
$F_{(.05,1,16)} = 4.49$				

The final hypothesis--Hypothesis 6--considers the fourth task, for which the mother's ascribed role was that of learner rather than teacher. It was predicted that both the child's IQ and level of social competence would be associated with differences in the amount of interaction accounted for by mother-dominated interaction patterns. Planned comparisons were used to examine differences in the proportions of time in patterns for parts A and B of this hypothesis. Likelihood ratios were used to compare the distributions of proportions of transitions in patterns.

Hypothesis 6.A. specifically predicted that a greater proportion of interaction during the fourth task is accounted for by maternal Explanation and Question-Response-Feedback patterns in dyads of mothers and moderately retarded children than in dyads of mothers and nonretarded children of equivalent chronological age or level of social competence.

Figures 13 and 14 present the mean proportions of time and transitions respectively in maternal teaching patterns. Planned comparisons of the mean proportions of time in Explanation and Question-Response-Feedback patterns resulted in a value of t less than that required for significance at the .05 level of confidence ($t = 0.861$; $t_{.05,30} = 1.697$). In comparisons of proportions of transitions devoted to maternal control patterns, the relative likelihood of the two sets of data under the null hypothesis that both come from the same distribution resulted in a value of χ^2 greater than that required for significance at the .001 level of confidence ($\chi^2_{ML} = 59.486$; $\chi^2_{1,.001} = 10.828$). Hence, the data

Figure 13

Mean Proportion of Time in Maternal Teaching Patterns during Task Taught by Child for Dyads Containing Retarded and Nonretarded Target Children ($n_{\text{TMR}}=20$, $n_{\text{Control}}=10$).

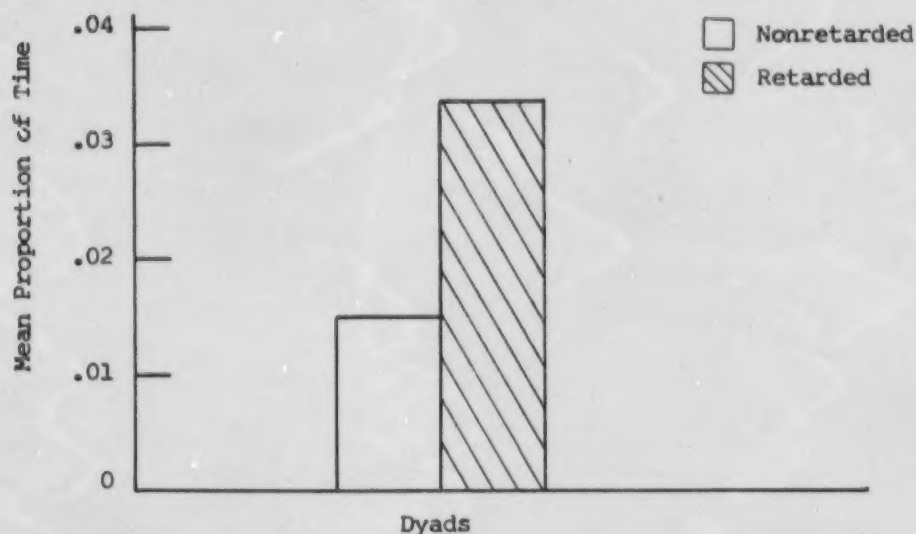
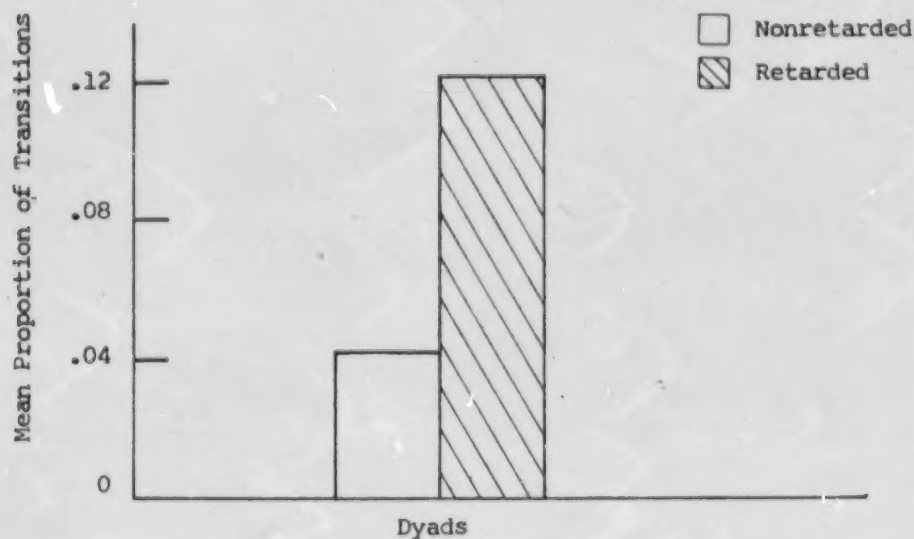


Figure 14

Mean Proportion of Transitions in Maternal Teaching Patterns during Task Taught by Child for Dyads Containing Retarded and Nonretarded Target Children ($n_{\text{TMR}}=20$, $n_{\text{Control}}=10$).



on number of transitions in patterns permitted rejection of this null hypothesis. This contrasted with the finding that the null hypothesis of equivalence of the two sets of data could not be rejected in the case of the data on time in patterns.

Hypothesis 6.B. predicted that the use of maternal Explanation and Question-Response-Feedback patterns by mothers of younger trainable mentally retarded children would be greater than the use of the same patterns by mothers interacting with older trainable children in the fourth task.

Figures 15 and 16 present the mean proportions of time and transitions respectively devoted to these patterns. The planned comparisons of mean proportions of time in Explanation and Question-Response-Feedback patterns resulted in a value of t which was negative and thus not significant in the one-tail test of the hypothesis ($t = 0.318$; $t_{.05,30} = 1.697$). The likelihood ratio comparisons resulted in a value of χ^2 greater than that required for significance at the .001 level of confidence ($\chi^2 = 11.722$; $\chi^2_{1,.001} = 10.828$). Again, as in 6.A, the null hypothesis could not be rejected for time data; but the differences between the two groups in proportions of transitions in maternal teaching patterns were sufficiently great to permit rejection of the null hypothesis.

Hypothesis 6.C. predicted a greater difference in the use of maternal Explanation and Question-Response-Feedback patterns in the fourth task when the interaction of mothers with their trainable retarded children was compared to their interaction with older siblings of these children than when the interaction of mothers with their trainable retarded children was compared to the interaction of the same mothers with younger

Figure 15

Mean Proportion of Time in Maternal Teaching Patterns
during Task Taught by Child for Dyads containing
Younger and Older Retarded Children ($n=10$).

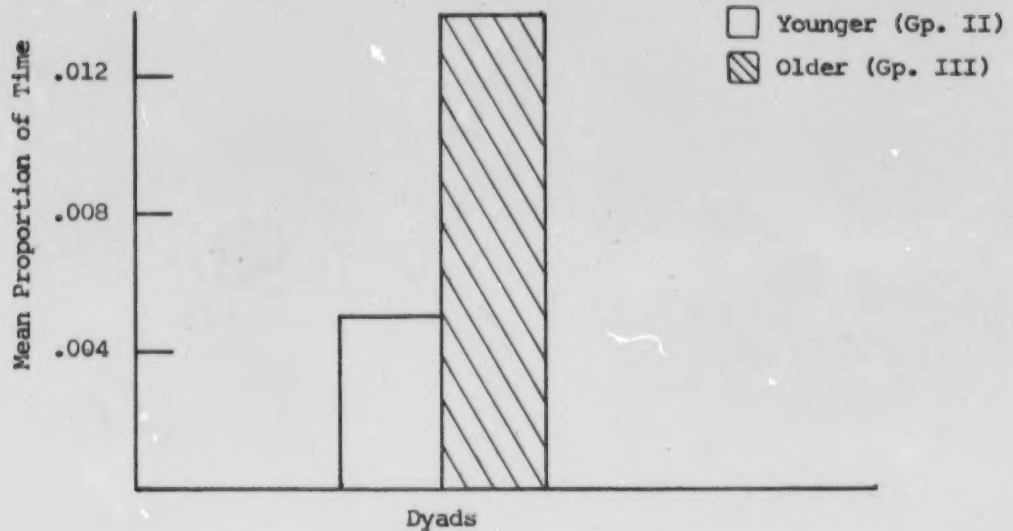
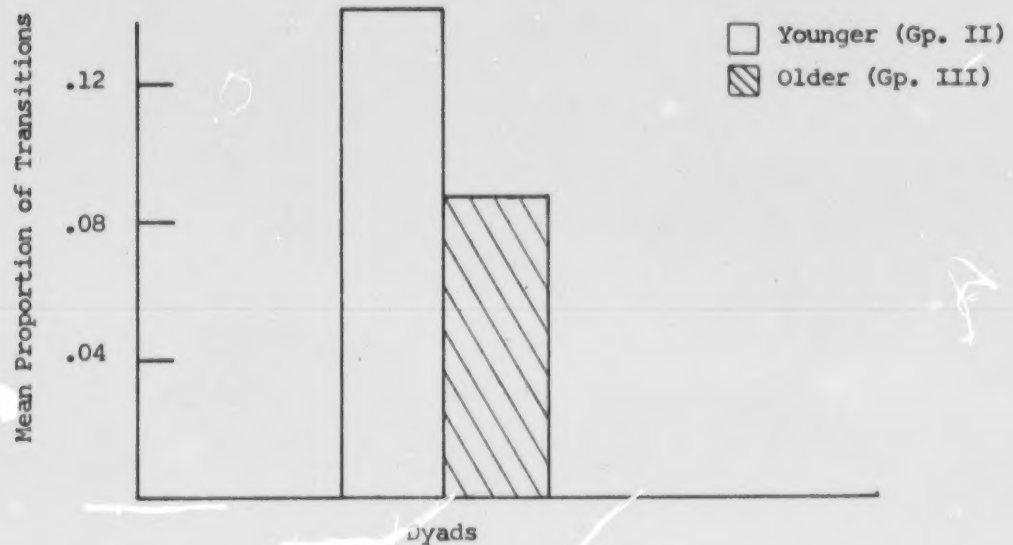


Figure 16

Mean Proportion of Transitions in Maternal Teaching Patterns
during Task Taught by Child for Dyads containing
Younger and Older Retarded Children ($n=10$).



siblings (younger vs. older than target subjects), was used to examine data on the difference in proportion of time in patterns. The summary of this analysis is presented in Table 16.

TABLE 16

Summary of Analysis of Variance for Experimental Groups on Data for the Proportion of Time in Maternal Teaching Patterns during the Task Taught by the Child for Two Factors: Age Group and Relative Age of Sibling.

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
A (Age group of TMR)	0.000867	1	0.000867	0.0109
B (Sibling: * Younger or Older)	0.046358	1	0.046358	0.5848
AB	0.017506	1	0.017506	0.2208
Within cell	1.268404	16	0.079275	

$$\underline{F}_{(.05,1,16)} = 4.49$$

The hypothesis would be supported by a significant main effect of the relative age of the sibling (Factor B). The $\underline{F}$ ratio for the main effect of this factor was too small ($\underline{F} = 0.5848$, $\underline{df} = 1,16$, $p > .05$) to permit rejection of the null hypothesis of no difference between the two groups. The differences in proportion of transitions in maternal patterns were compared by means of the Mann-Whitney $\underline{U}$ technique. Relevant data are presented in Table 13. The value of $\underline{U}$ obtained ($\underline{U}=43$) was too great for rejection of the null hypothesis ($\underline{U}_{\text{critical}} = 27$).

To summarize the results of the tests of Hypothesis 6, the proportions of time devoted to maternal Explanation and Question-Response-Feedback patterns in the fourth task were not significantly different for retarded and nonretarded dyads or for younger trainable and older trainable dyads. However, the comparisons of these same groups with regard to the proportions of transitions in maternal teaching patterns were both significant at the .001 level of confidence. For neither proportion of time nor proportion of transitions in maternal teaching patterns were the within-mother differences significantly greater for mothers interacting with trainable retarded children and older siblings than for mothers interacting with trainable retarded children and their younger siblings.

Summary.

Table 17 presents a summary of the results of tests of the six hypotheses of the present study.

TABLE 17
Summary of Results

<u>Interest</u>	<u>Hypothesis</u>	<u>Comparison</u>	<u>Measure</u>	<u>Supp</u>
Association of level of social competence and use of elaborated patterns.	1. Positive correlation	Time:	Multiple R	
		a. Control		none
		b. Younger TMR		none
		c. Older TMR		none
		Transitions	Kendall's tau	
		a. Control		none
Utility of Level of Social Competence to predict use of elaborated patterns (compared to utility of other descriptive measures).	2. LSC strongest predictor of use of elaborated patterns	b. Younger TMR		none
		c. Older TMR		none
		A. (Total sample)		
		Time	Stepwise regression	none
		Transitions	Kendall's tau	p < .05 For S only
		B. (TMR dyads)		
		Time	Stepwise regression	LSC & extra early than total sample
		Transitions	Kendall's tau	none

TABLE 17

Summary of Results

<u>Hypothesis</u>	<u>Comparison</u>	<u>Measure</u>	<u>Support</u>
1. Positive correlation	Time:	Multiple R	
	a. Control		none
	b. Younger TMR		none
	c. Older TMR		none
	Transitions	Kendall's	
	a. Control	<u>tau</u>	none
2. LSC strongest predictor of use of elaborated patterns	b. Younger TMR		none
	c. Older TMR		none
	A. (Total sample)		
	Time	Stepwise regression	none
	Transitions	Kendall's	
		<u>tau</u>	p < .05
			For Self-Help only
	B. (TMR dyads)		
	Time	Stepwise regression	LSC scores extracted earlier than in total sample.
	Transitions	Kendall's	none
		<u>tau</u>	

TABLE 17

p.2

<u>Interest</u>	<u>Hypothesis</u>	<u>Comparison</u>	<u>Measure</u>	<u>Support</u>
Differential effects of tasks (Stacking, Etch-A-Sketch (EAS), Sorting) on use of Explanation & Question-Response-Feedback patterns	3.			
	A. <u>Question-Response-Feedback patterns</u>	Time	Trend analysis	$p < .0$ with Target TMR S
	Sorting-EAS > EAS-Stacking	Transitions	Wilcoxon's T	$p < .0$ With Target
	B. <u>Explanation patterns</u>	Time	Trend analysis	none
Differential use of elaborated and restricted patterns by experimental groups.	EAS-Stacking > Sorting-EAS	Transitions	Wilcoxon's T	none
	4.			
	<u>Elaborated patterns:</u>			
	A. $TMR_{target} > TMR_{target}$	Time	Planned comparison	none
		Transitions	Likelihood ratio	$p < .0$
	B. $TMR_{older} > TMR_{younger}$	Time	Planned comparison	none
		Transitions	Likelihood ratio	$p < .0$
	<u>Restricted patterns:</u>			
	C. $TMR_{target} < TMR_{target}$	Time	Planned comparison	$p < .0$
		Transitions	Likelihood ratio	none

TABLE 17

p.2

<u>Hypothesis</u>	<u>Comparison</u>	<u>Measure</u>	<u>Support</u>
3.			
A. <u>Question-Response-Feedback patterns</u>	Time	Trend analysis	$p < .05$: Mothers with nonretarded Target <u>Ss</u> & Older TMR <u>Ss</u>
Sorting-EAS > EAS-Stacking	Transitions	Wilcoxon's <u>T</u>	$p < .01$: Mothers with nonretarded Target <u>Ss</u>
B. <u>Explanation patterns</u>	Time	Trend analysis	none
EAS-Stacking > Sorting-EAS	Transitions	Wilcoxon's <u>T</u>	none
4.			
<u>Elaborated patterns:</u>			
A. $\overline{\text{TMR}}_{\text{target}} > \text{TMR}_{\text{target}}$	Time	Planned comparison	none
	Transitions	Likelihood ratio	$p < .001$
B. $\text{TMR}_{\text{older}} > \text{TMR}_{\text{younger}}$	Time	Planned comparison	none
	Transitions	Likelihood ratio	$p < .001$
<u>Restricted patterns:</u>			
C. $\overline{\text{TMR}}_{\text{target}} < \text{TMR}_{\text{target}}$	Time	Planned comparison	$p < .05$
	Transitions	Likelihood ratio	none

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TABLE 17

p.3

<u>Interest</u>	<u>Hypothesis</u>	<u>Comparison</u>	<u>Measure</u>	<u>Suppo</u>
Differential use of Orien- tation patterns by experimental groups	4.			
	D. $TMR_{older} < TMR_{younger}$	Time	Planned	none
		Transitions	comparison	
			Likelihood	$p < .0$
			ratio	
	<u>Within-mother</u>			
	E. <u>Elaborated</u>			
	<u>patterns:</u>			
	$TMR_{older\ sib} >$	Time	ANOVA	none
	$TMR_{younger\ sib}$	Transitions	Mann-Whitney	none
			<u>U</u>	
	F. <u>Restricted</u>			
	<u>patterns:</u>			
	$TMR_{older\ sib} >$	Time	ANOVA	$p < .0$
	$TMR_{younger\ sib}$	Transitions	Mann-Whitney	none
			<u>U</u>	
	5.			
	A. $TMR_{target} > TMR_{target}$	Time	Planned	none
		Transitions	comparison	
			Likelihood	$p < .0$
			ratio	
	B. $TMR_{older} > TMR_{younger}$	Time	Planned	none
		Transitions	comparison	
			Likelihood	none
			ratio	
	C. <u>Within-mother:</u>	Time	ANOVA	none
	$TMR_{older\ sib} >$	Transitions	Mann-Whitney	none
	$TMR_{younger\ sib}$		<u>U</u>	

TABLE 17
p.3

<u>Hypothesis</u>	<u>Comparison</u>	<u>Measure</u>	<u>Support</u>
4.			
D. $TMR_{older} < TMR_{younger}$	Time	Planned comparison	none
	Transitions	Likelihood ratio	$\underline{p} < .005$
<u>Within-mother</u>			
E. <u>Elaborated patterns:</u>			
TMR-older sib >	Time	ANOVA	none
TMR-younger sib	Transitions	Mann-Whitney U	none
F. <u>Restricted patterns:</u>			
TMR-older sib >	Time	ANOVA	$\underline{p} < .05$
TMR-younger sib	Transitions	Mann-Whitney U	none
5.			
A. $TMR_{target} > TMR_{target}$	Time	Planned comparison	none
	Transitions	Likelihood ratio	$\underline{p} < .005$
B. $TMR_{older} > TMR_{younger}$	Time	Planned comparison	none
	Transitions	Likelihood ratio	none
C. <u>Within-mother:</u>			
TMR-older sib >	Time	ANOVA	none
TMR-younger sib	Transitions	Mann-Whitney U	none

TABLE 17

p.4

<u>Interest</u>	<u>Hypothesis</u>	<u>Comparison</u>	<u>Measure</u>	<u>Support</u>
Differential use of maternal teaching patterns (Explanation & Question-Response-Feedback) by experimental groups during task taught by child	6.			
	A. $\overline{\text{TMR}}_{\text{target}} < \text{TMR}_{\text{target}}$	Time	Planned comparison	none
		Transitions	Likelihood ratio	$p < .0$
	B. $\text{TMR}_{\text{younger}} > \text{TMR}_{\text{older}}$	Time	Planned comparison	none
		Transitions	Likelihood ratio	$p < .0$
	C. Within-mother:	Time	ANOVA	none
	$\text{TMR}_{\text{-older sib}} >$	Transitions	Mann-Whitney	none
	$\text{TMR}_{\text{-younger sib}}$		<u>U</u>	

TABLE 17
p.4

<u>Hypothesis</u>	<u>Comparison</u>	<u>Measure</u>	<u>Support</u>
6. <u>TMR</u>			
A. <u>target</u> < <u>TMR</u> <u>target</u>	Time	Planned comparison	none
	Transitions	Likelihood ratio	$p < .001$
B. <u>TMR</u> <u>younger</u> > <u>TMR</u> <u>older</u>	Time	Planned comparison	none
	Transitions	Likelihood ratio	$p < .001$
C. <u>Within-mother:</u>	Time	ANOVA	none
<u>TMR-older sib</u> >	Transitions	Mann-Whitney	none
<u>TMR-younger sib</u>		U	

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CHAPTER VII

DISCUSSION

It was the basic hypothesis of this study that, when mothers interact with children whom they perceive as being significantly retarded, they restrict the complexity of the interaction to a simpler process than is typical when they interact with nonretarded children. In testing the specific experimental predictions derived from this major hypothesis, the interaction of three groups of mother-child dyads was observed in a set of four experimental tasks. In deriving the experimental hypotheses, it was uncertain whether the differences in the interaction of adults and retarded children were the result of the actual limitations in the capabilities of the retarded children or of limitations assumed to exist in one who is labeled retarded. It was for the purpose of providing evidence on these alternatives that the two groups of trainable mentally retarded children were included in the study.

Discussion of Specific Hypotheses

It was felt that the most important of the variables describing the dyad members was the level of social competence of the child as measured by scores on the Cain-Levine Social Competency Scale. The first hypothesis, predicting a positive correlation of Cain-Levine scores and use of elaborated patterns, was not supported by data on proportion of time or proportion of transitions devoted to elaborated patterns.

Results of the tests of data for the second hypothesis were less clear-cut. The stepwise regression analysis of the proportions of time in restricted and elaborated patterns did not support the hypothesis that level of social competence measures would be the strongest predictors of interaction pattern in the total sample. In fact, the multiple correlation of all nine descriptive variables with restricted patterns accounted for only 21 percent of the variance; the correlation of these variables with proportion of time in elaborated patterns accounted for only 34 percent of the total variance. However, in the groups of mother-retarded child dyads (Groups II & III), level of social competence measures were much stronger predictors of interaction style. In the prediction equations for the use of restricted patterns, Cain-Levine subscale and total scores were extracted in three of the first five steps for both Groups II and III, accounting for 79 and 72 percent of the total variance, respectively. Regression equations predicting the use of elaborated patterns also extracted three Cain-Levine scores within the first five steps for dyads of mothers and young retarded children (Group III), accounting for 86 percent of the total group variance in scores.

Analysis of transition data yielded no significant correlations of level of social competence with use of elaborated or restricted patterns for dyads of mothers and retarded children. In the total group, there were three groups of significant rank-order correlations, however. As expected, correlations of use of elaborated patterns with mother's educational level and with father's educational level were significant

and positive, and correlations of use of restricted patterns with mother's and with father's educational attainments were significant but negative. Contrary to expectation, however, significant negative correlations of the proportion of transitions devoted to elaborated patterns with the child's chronological age, the number of children in the family and with Cain-Levine Self-Help scores were obtained.

These first two hypotheses were proposed to test the strength of the measure of level of social competence as a predictor of the complexity of maternal interaction. The inconsistent findings for time and transition data may argue against either or both of the measures chosen or against the basic hypothesis of the nature of the association of the two.

The Cain-Levine Social Competency Scale has been used elsewhere to compare parents' perceptions of the functioning of trainable retarded children to the perceptions of the children's teachers (Tallman, 1965; VanEvery, Semmel, & Sitko, 1972). In both studies, the scale reflected anticipated differences in the perceptions of the child's capabilities by significant adults in his life. As a function of differences in the perceived capabilities of the children, differences in the nature of the mother's interaction with them such as were found by Siegel (1963a, 1963b; Siegel & Donovan, 1964) and Spradlin and Rosenberg (1964) were expected. As was pointed out earlier, the differences in interaction found in these studies were very similar to the differences between elaborated and restricted patterns described by Bernstein (1961, 1964) and Hess and Shipman (1968).

However, the specific interaction sequences chosen as restricted and elaborated patterns may not have been totally appropriate. That is, it was assumed from other research on the dyadic interaction of mothers with retarded and with nonretarded children that elaborated patterns are very specific, often linguistically complex sequences which communicate the content of a situation verbally. Restricted patterns consist of simpler and less verbally informative sequences. Based on the Bernstein and Hess and Shipman formulations it was hypothesized that the proportion of interaction devoted to elaborated patterns would increase as the apparent capability of the child in the dyad increased. The relationship between complexity of interaction and perceived ability under this assumption is illustrated in Figure 17. Such a model may ignore the basic interpersonal communication processes, however, and may be appropriate only when task complexity increases. In the experimental teaching situations, the tasks selected were not so difficult that dyads of mothers and very young and/or retarded children would find them impossible. Hence, dyads of mothers and children of apparently greater competence often found little need for complex verbal interactions, since both members of the dyad readily understood the task requirements. If this is an accurate conceptualization of the situation, the interaction model in Figure 18 might be more accurate. This model does not run counter to that presented earlier when the difficulty of the tasks is high or when the actual or perceived capability of the child is restricted to the lower levels as it was in the studies by Hess and Shipman (1968), Siegel (1963a, 1963b; Siegel & Harkins, 1963; Siegel &

Figure 17

Model I: Proposed Relationship between Perceived Capability of Child and Complexity of Primary Verbal Interaction Used by Others with Him.

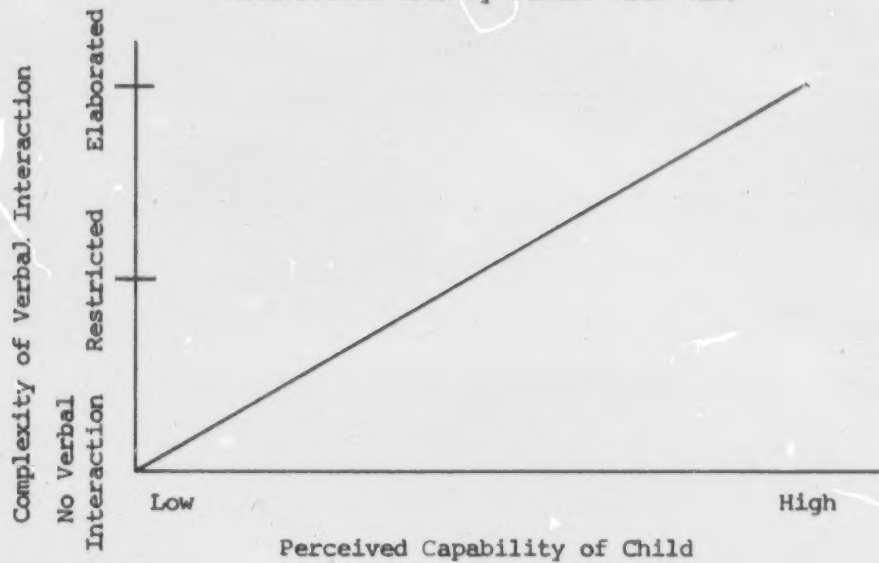
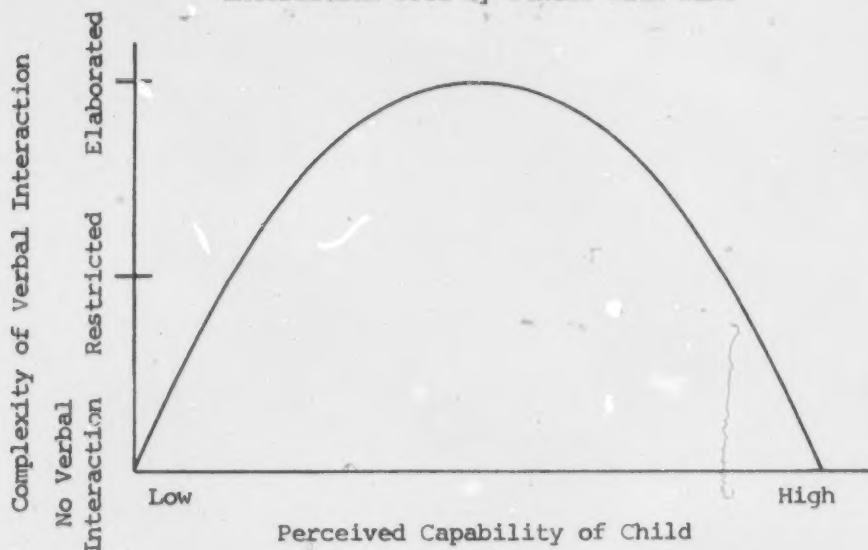


Figure 18

Model II: Proposed Relationship between Perceived Capability of Child and Complexity of Primary Verbal Interaction Used by Others with Him.



Donovan, 1964) and Spradlin and Rosenberg (1964). It would, however, account for low correlations between the use of elaborated patterns and the measures of level of social competence in this study which included a much wider range of functioning ability. That is, in the total sample, all the descriptive measures (including measures of level of social competence) accounted for very little of the total variance in interaction scores. In the groups of mother-retarded child dyads, however, 70 to 86 percent of the total variance was accounted for by the first five variables extracted which included, for three of the tests, three Cain-Levine subscale scores. In view of the often observed increase in correlations between variables when the range of scores on both is increased, we would not expect lower correlations in the total sample than in the more homogeneous subgroups if the first model accurately described the relationship between ability and use of elaborated patterns. Additionally, the correlation of ability and the use of restricted patterns should be negative under the first model; but these correlations were, instead, positive. The second model, proposing a curvilinear relationship between ability of the child and complexity or "elaborateness" of interaction, appears to fit the data better. Thus, the low correlations of ability and complexity of interaction in the total sample would be predicted by the model since linguistic complexity of verbal communication would be low at both ends of the continuum of ability. Higher correlations in the subgroups of mothers and retarded children occurred as predicted because capabilities of the children were in the lower ranges of the scale, thus only the positively-sloped portion of

the curve was involved. Finding positive rather than negative correlations between perceived ability of the child and use of restricted patterns is not predicted by the second model. This suggests that the relationship between the perceived capability of the child and the complexity of verbal interaction may be even more complex than indicated in Figure 18, that the patterns selected as restricted were not restricted after all, or that the original hypothesis that mothers working with less capable children use more restricted verbal interaction is in error.

As orthogonal sources of data, proportion of time and proportion of transitions in patterns were free to vary independently. Differences in the results obtained for time and transition data were slight for the total sample. Rather than being incongruities or inconsistencies in results, these differences can be conceptualized as reflecting differences in the tempo or rate of change in interaction--a measure relating number of transitions in and duration of interaction.

In the total sample, the negative correlation of Cain-Levine Self-Help scores with proportion of transitions in elaborated patterns, coupled with nonsignificant associations of proportion of time in elaborated patterns and descriptive scores, suggests a more rapid change of behavior for mothers of less capable children than for mothers of more capable children even though the total proportion of time devoted to elaborated patterns doesn't vary to a predictable degree with measures of the capability of the child. This description is also congruent with the results obtained for dyads of mothers and moderately retarded children. In these groups, the positive association of proportion of time in elaborated and restricted patterns with measures of level of social competence,

coupled with the nonsignificant associations of proportion of transitions in patterns with measures of level of social competence again suggests that mothers working with less capable children are making more rapid changes in behavior than are mothers working with more capable children.

The third hypothesis sought out differential effects of the experimental tasks on the interaction patterns used by the mother. The differences between tasks were as predicted for the Control group's (Group I) use of Question-Response-Feedback patterns. The younger trainable retarded group (Group II) failed to show the curvilinear relationship of tasks and patterns that was predicted. For dyads of mothers and older trainable retarded children (Group III), although the quadratic trend was significant, the direction of the increase was opposite to that predicted, with the greater increase in use of Question-Response-Feedback patterns occurring in the Etch-A-Sketch task when compared to Block-Stacking rather than in Sorting when compared to the Etch-A-Sketch task.

In the mean proportions of time in Question-Response-Feedback patterns, values were very similar for dyads containing Target children and siblings of the Control group, and for dyads containing siblings of the other two groups. Dyads of mothers and retarded children in Groups II and III showed similar mean proportions of time in Question-Response-Feedback patterns for the Block Stacking and Etch-A-Sketch tasks but were quite different on the Sorting task. On the Sorting task, the younger retarded children were very similar to the dyads of mothers and Target children of the Control group--children of equivalent chronological age. Dyadic interaction of mothers and older retarded children was more similar

to the interaction with the siblings of these children. Relationships between mean proportions of transitions in Question-Response-Feedback patterns were similar to those for time data.

In examining the use of Explanation patterns, the infrequency of these patterns is particularly noticeable--less than 20 percent of time and less than 10 percent of transitions in patterns for all groups were devoted to Explanation patterns.

Examination of data on proportion of time in patterns showed that although quadratic trends were not significant, linear trends were significant for Groups II and III in the main effect of tasks and, for Group III, in the interaction of tasks and position (target or sibling). Overall, a slight increase in the mean proportion of time in Explanation patterns across Block Stacking/Design Copying, Etch-A-Sketch and Sorting/Magic Tricks was observed for mothers and Target children of Group I and for mothers and siblings of Group III. Little variation across tasks was shown by mothers and Target children of Group II, while curvilinear changes were apparent for the other groups. Transition data showed a slight increase across tasks for Control dyads but little change for dyads of mothers and retarded children.

From these analyses it appears, then, that Explanation was a relatively little-used strategy, showing few differences between groups or between tasks. Thus, in a dyadic teaching situation, mothers appeared to devote little time to prolonged explanation of the task requirements, relying instead on the interaction with the child to communicate the task requirements to him. In other research (Hess & Shipman, 1965c;

Brophy, 1969), the use of prerespone orientation and explanation was greater for middle-class mothers than for lower-class mothers. The greater use of Explanation patterns by the Control group during the Sorting task than during the other tasks might be seen as an example of this proactive influence. Question-Response-Feedback sequences were somewhat more common in the more complex Etch-A-Sketch and Sorting/Magic Tricks tasks and were differentially used by the various experimental groups.

The greater amount of time and number of transitions in Question-Response-Feedback patterns for mothers interacting with retarded children again supports the argument that interaction with more capable children in simple situations is characterized by less verbalization than is the case in interaction with children of apparently lower ability. As the task complexity increased, the use of interrogation strategies increased for all dyads, but on the most difficult task, results appear to support postulation of an effect which might be attributable to an interaction of the child's apparently low IQ and his chronological age. That is, mothers working with the younger trainable retarded children (Group II) devoted more interaction to interrogation strategies in simpler tasks and maintained the strategy on the sorting task at a level equal to that shown by mothers working with four-to-six year old Target children of the Control group (Group I). Mothers interacting with older retarded children (Group III) showed a great drop in the amount of interaction devoted to Question-Response-Feedback patterns on the most complex task, perhaps indicating deformation of normal teaching strategies by their prolonged interaction with their retarded children so that they do not seek confirmation of understanding from these children on difficult tasks.

The intermediate use of Question-Response-Feedback patterns with siblings of the retarded Target children may indicate a "spillover" of the effect of the retarded child on maternal interaction style leading to similar maternal teaching strategies at a somewhat more implicit (i.e. less verbal) level.

The remaining hypotheses were specifically concerned with the identification of differences in the interaction of dyads of mothers with retarded and with nonretarded children.

The fourth hypothesis examined the relative use of elaborated and restricted patterns (Explanation and Question-Response-Feedback) in the experimental groups. Comparisons of groups of dyads showed congruence of time and transition data in the direction of the differences between groups. Likelihood ratio tests for identity of the distributions of transitions led to rejection of the null hypothesis in three of the four subparts of this hypothesis; equivalent distributions were found only for retarded and for nonretarded control dyads in the use of restricted patterns. Planned comparisons of the differences between means indicated significant differences between groups only in the comparison of Target dyads containing retarded children and Target dyads containing nonretarded children. Thus, the comparisons of retarded and nonretarded Target dyads show no significant difference in proportion of time but a significantly greater proportion of transitions in elaborated patterns for dyads of mothers and nonretarded Target dyads, indicating a more rapidly changing, more highly differentiated use of elaborated patterns for this group.

Similarly, comparison of the use of restricted patterns--showing more time in restricted patterns for dyads of mothers and retarded children but no significant difference in proportions of transitions between the groups--would also appear to indicate a lower rate of change in the interaction of dyads of mothers and retarded children, with more time devoted to each pattern.

Comparisons of the interaction of mothers and younger retarded children showed no difference in the proportion of time in elaborated or restricted patterns, but the proportion of transitions was greater for dyads of mothers and younger retarded children for both kinds of patterns, again indicating more rapid changes in interaction category within pattern types for this group.

These results provide further support for the assumption that the patterns chosen as elaborated and restricted in this study do not differentiate groups of dyads well, both being used to a similar extent by the various experimental groups. This does not imply that elaborated and restricted patterns occur with equal frequency or duration (restricted patterns accounted for a greater proportion of interaction time and transitions than did elaborated patterns), but the experimental groups do not differ greatly in their use of each of the two classes of patterns.

The final two subparts of this hypothesis looked for differences in the interaction of mothers in Groups II and III with their retarded and their nonretarded children. Specifically, differences in the interaction of mothers with retarded children and with older siblings were compared to differences in the interaction of mothers with retarded

children and with their younger siblings.

Comparisons of differences between these groups in the use of elaborated patterns yielded no significant differences in either time or transition data. Comparisons of differences in the use of restricted patterns revealed significantly greater differences between retarded children and older siblings than were found between retarded children and younger siblings, with a greater proportion of time in restricted patterns occurring in the interaction of mothers and retarded children. Differences in the proportion of transitions accounted for by restricted patterns were not significant. This would indicate a slower rate of change in restricted patterns for dyads of mothers and retarded children than occurs in the interaction of these mothers and older nonretarded siblings of the retardate.

The amount of interaction devoted to orienting the child to the nature of the task was examined in the fifth hypothesis. No significant differences in the proportion of time devoted to Orientation patterns by dyads of mothers and retarded children and by dyads of mothers and nonretarded Target children were found; however, dyads of mothers and retarded children showed a significantly greater proportion of total transitions in Orientation than did Control dyads. The proportions of time and transitions in Orientation patterns were not significantly different when the interaction of dyads of mothers and younger retarded children was compared to the interaction of mothers and older retarded children.

Examination of the use of Orientation patterns by mothers in Groups II and III working with their retarded and with their nonretarded children did not result in any significantly greater differences between retardates and younger siblings than were found between retardates and older siblings.

It appears, then, that very little difference exists between the experimental groups in the amount of motivation and orientation to the task requirements provided by the mother. The apparently more rapid tempo of interaction for dyads of mothers and retarded children may indicate that these mothers more actively attempt to maintain motivation and to control the child's behavior while explaining the general nature of the task to them, whereas mothers working with nonretarded children maintain a more constant interaction during this portion of the teaching episode. In view of Zeaman and House's (1963) characterization of the problem of the retardate as one of focusing on the relevant aspects of the learning situation, such a strategy would seem to be necessary and appropriate. However, in the Chicago Preschool Study (Hess & Shipman, 1965c; Brophy, 1969) greater use of Orientation was associated with more elaborated interaction in higher socioeconomic status groups. Therefore, it was not expected that dyads of mothers and retarded children would show greater use of these patterns than would dyads of mothers and non-retarded children in the present study, as the results suggest.

The final hypothesis of the study attempted to examine the intrusiveness of mothers in situations which cast them in the role of learner rather than teacher. It was predicted that mothers working with retarded children would be more likely to take over as teacher than would mothers

working with nonretarded children and that this tendency would be greater for mothers working with younger retarded children than for mothers working with older retarded children.

Results showed no significant difference in the proportion of time in maternal teaching patterns for either of these comparisons. The distributions of the proportions of transitions in maternal teaching patterns were significantly different in the predicted direction for both comparisons. These results can also be interpreted as reflecting a faster tempo or rate of interaction for dyads containing retarded children and, within this group, for dyads containing younger retarded children.

Examination of differences in the occurrence of maternal teaching patterns in the interaction of mothers in Group II and III with their retarded and their nonretarded children did not reveal significantly greater differences in the proportion of time or transitions devoted to the use of these patterns when older siblings and retardates were compared than when younger siblings and retardates were compared.

Overall, it appears that the anticipation that mothers working with retarded children would take control of a situation in which the child was assigned the role of teacher to a greater extent than would mothers working with nonretarded children was not borne out by the data, although the more rapid rate of change in maternal teaching patterns used by mothers with retarded children and, in particular, with younger retarded children, might represent a more active attempt by these mothers to control interaction.

Restatement of the major points of this discussion emphasizes the dual concerns of the study--the content and the process of mother-child interaction.

The Content of Mother-Child Interaction

In the introduction to this study, empirical and theoretical bases for the description of elaborated and restricted styles of communication were presented, and research findings suggesting specific modifications in the language used by adults with retarded children were interpreted as evidence that adult interaction with the retarded might be primitive and restricted in nature. Results of the present study suggest that the relationship between the apparent capability of members of a dyad and the "elaborateness" or "restrictedness" of the interaction between them is a complex, nonlinear one. Rather than providing a linguistically barren environment in which communication tends to be nonspecific and syntactically simple, mothers working with retarded children more often showed a difference in the rate of change in the patterns examined as compared with mothers of more capable children.

Mothers working with retarded children changed interaction categories in the orientation and motivation of the child more rapidly than did mothers working with nonretarded children. Whether this alternation of motivation, control and orientation provided more successful focusing of the retarded child's attention on the task to be learned or whether it was too fragmented to be effective in directing the child's attention to relevant aspects of the situation cannot be determined from the information available in this study. In view of the importance assigned

to prerespone orientation in the education and training of the moderately retarded, largely as a result of the Zeaman and House research, the effectiveness of such interaction patterns as used by parents should be investigated more fully.

The more rapid tempo of interaction in the use of elaborated and restricted patterns for mothers and nonretarded children than for dyads of mothers and retarded children showed more differentiated and more rapidly variable use of teaching patterns with apparently unimpaired children. Since mothers teaching younger retarded children also showed a more rapid rate of change in elaborated and restricted patterns than did mothers working with older retarded children, an effect of the perceived defect of the retarded child that increases with the child's age was suggested.

In the teaching situation of this study all mothers relied more on the give and take of interrogation and feedback strategies than on overt presentation of information through direct explanation. However, a spillover of the age-related shift in maternal teaching strategy observed with mothers and retarded children appears to occur in the interaction of the mothers and siblings of the retarded children resulting in a level of use of interrogation and feedback patterns which was intermediate to that used in dyads containing retarded children and dyads containing nonretarded Target children. Thus, the presence of a moderately retarded child in the family may not only lead the mother to develop a specialized strategy for teaching him but may also affect her manner of interacting with her other, nonretarded children.

Finally, the more rapid rate of change in maternal teaching patterns for mothers working with retarded children (particularly younger retarded children) when the role of teacher was assigned to the child might also indicate a greater attempt to intrude and take over control of the situation through short but frequent teaching moves.

Failure to find differences of the expected magnitude in the interaction of dyads of mothers and nonretarded children may support the results of other studies of parental attitudes which showed generally accurate judgments by parents of the capabilities of their retarded children. In keeping with the accuracy of these judgments, maternal teaching and control patterns used with retarded children may have been less than optimal in tempo; but the differences appeared to be subtle.

The Process of Description and Analysis

The analysis procedures of the study demonstrated the value of the computer-based system for coding and processing data. By permitting coding of the interaction of mothers and children according to a complex system of categories of verbal and nonverbal behavior on a single pass through the data, the possible effects of the coders' knowledge of subsequent events on the coding of a particular bit of behavior are avoided. The identification of families of sequential chains of behavior with a common focal element was followed by analyses which considered the necessity for interpreting both length of time in and number of transitions between categories as orthogonal components of interaction.

These procedures pointed up still other problems in the description and analysis of interaction data which previously used techniques had not suggested.

The demonstrated independence of time in pattern and number of transitions in patterns necessitated separate analyses of these two data sources for each hypothesis. When the results of these dual analyses were in agreement, interpretation was not difficult. When one comparison was significant and the other was not, however, it appeared that the differences between the groups were not solely in the duration of patterns or in the number of changes in interaction but in the tempo of the mother-child interaction--the rate at which the behaviors changed. Such an indication of more rapid changes within a pattern suggests more differentiation and variability in the pattern per unit of time. Whether a more rapid tempo represents an elaborated strategy by providing a more complex and meaningful sequence of verbal and nonverbal behaviors or a restricted strategy which communicates inefficiently because patterns are too fragmented to be effective may depend on the specific patterns and situations being examined.

It was the major hypothesis of the study that mothers teaching moderately retarded children would use more restricted patterns than would mothers teaching nonretarded children of equal chronological age or level of social competence; use of elaborated patterns was expected to be greater for dyads of mothers and nonretarded children. However, although the specific sequences of interaction chosen as restricted and elaborated patterns were derived from existing theory and research, the selections do not appear to have been totally appropriate. That is, the distinction of restricted and elaborated patterns in terms of the relative frequency and duration of simple, primarily nonverbal patterns

and complex, primarily verbal patterns ignores one of the significant advantages of elaborated communication patterns--the amount of time and talk saved by these more informative sequences. Hence, no simple linear relationship between the amount of time or the number of transitions in "elaborated" patterns and the complexity or richness of the information being communicated should be expected. Additionally, in the dyadic interaction of mothers and older, more capable children (e.g. older siblings of eleven to thirteen-year-old retarded children), much of the interaction is nonverbal and cooperative rather than verbally instructive since both members of the dyad readily comprehend the task requirements.

For this reason, the quantitative characterizations of duration of patterns and pattern frequency may not only be insufficient for the purpose of differentiating elaborated and restricted styles but may actually be misleading since truly elaborated patterns need not occur with great frequency or be maintained for long periods of time in order to exert a strong influence on the behavior of individuals. The definition of elaborated and restricted communications codes must be made more precise, and parameters affecting the use of these patterns must be specified. Such parameters would include situational variables (e.g. the nature and difficulty of the task), subject variables (e.g. the developmental level of the individual), and social and cultural influences on communication. As discussed earlier in this chapter, the relationship among these variables is not likely to be a simple one. Thus, we must guard against overgeneralizing from the findings of studies which have

varied situational, subject, or social variables only within narrow limits. Effort must also be devoted to looking for a better dependent variable than time in pattern or number of transitions in pattern before further research into qualitative aspects of interaction patterns differentiating groups is undertaken. Such a measure might characterize interaction episodes in terms of the most complex patterns used within them or might attempt to specify information transmitted in patterns. Any measure chosen should not require ratings of interaction or post hoc judgments of the complexity of sequences by observers but should be applicable to real-time computer-based coding of interaction.

This study was designed to provide information about differences in the way middle-class mothers interact in a teaching situation with moderately mentally retarded children and with nonretarded children. The result of the study appears to be the indication of a number of interesting similarities and differences in the content and process of the dyadic interaction of these groups as well as the suggestion that some change in the traditionally used dependent measures may be necessary if more meaningful differences in interaction are to be discovered.

Implications

Parents are often the primary sources of instruction of moderately mentally retarded children, who appear to require more explicit guidance in the acquisition of functional skills than do the nonretarded. It is hoped that research on patterns of parental teaching used with retarded and nonretarded children will suggest optimal strategies associated with maximum development of capabilities in the retarded. Acquisition of

such strategies could then be the focus of programs for modification of parental behaviors. Data from the present study suggest that rate of change in interaction patterns may be an important dependent variable in this research. The importance of proactive patterns (orientation and motivation) and the effectiveness of the particular proactive patterns used by mothers with retarded children must be investigated further, as must the effect of a lack of confidence in the child on the tendency of mothers to dominate the teaching role even when it is inappropriate to do so.

Attempts to change parental behavior before this descriptive information is gathered will, at best, involve an unknown proportion of erroneous guesses about what must be changed and, at worst, could totally fail to include optimal teaching strategies within training programs.

CHAPTER VIII

SUMMARY

Two problems were considered in this study: (1) Substantively, the study was designed to evaluate a series of hypotheses comparing the nature of verbal and nonverbal interaction patterns used within dyads of middle-class mothers and trainable mentally retarded children to patterns used within dyads of middle class mothers and nonretarded children. (2) Methodologically, the study was designed to demonstrate and evaluate a computer-based (CATT) system for the coding of observational data and an analysis strategy permitting the identification of sequential regularities (chains) in behavior.

Since any evaluation of teaching must consider the characteristics of the learners involved, research evidence of the learning characteristics of noninstitutionalized moderately retarded children was reviewed. The attitudes of parents and their expectations regarding the capabilities of their trainable retarded children were considered as a second major factor influencing interaction styles. Finally, techniques for direct observation of mother-child interaction were reviewed and problems in recording, coding and analyzing this data were discussed. Based on this information, models of mother-child interaction and communication under enriched and deprived conditions were presented. Within these models, communication patterns differentiating elaborated and restricted maternal teaching styles were described. Finally, the basic assumptions of an analysis technique for identifying behavior strategies were outlined.

The experimental hypotheses compared maternal teaching strategies used by middle-class mothers with moderately retarded children to strategies used by middle class mothers with nonretarded children. These predictions were framed in terms of (a) differences in maternal teaching strategies used by the same mother in interaction with her moderately retarded and nonretarded children and (b) differences in maternal teaching patterns used by a mother with a trainable retarded child when compared with the patterns used by a mother with a nonretarded child of equivalent chronological age or measured level of social competence. It was predicted that a primary determinant of maternal teaching style is the mother's perception of her child's capabilities--particularly his communication, self-care, independence and social skills. However, in keeping with a hypothesized "defect" orientation of middle-class mothers toward their trainable mentally retarded children, it was predicted that a more restricted teaching style would be used by these mothers than would be seen in mothers interacting with nonretarded children of similar chronological age or measured level of social competence. Effects of the mother's ascribed role as teacher or learner were also expected to be different for mothers interacting with their moderately retarded children and mothers interacting with nonretarded children. Mothers interacting with retarded children were expected to resist being put in the role of learners when their children were the teachers and to take over control of the interaction to a greater degree than would mothers interacting with nonretarded children under the same conditions. It was not expected that these differences necessarily represented stable

response characteristics of each mother to all her children, but rather that they represented specific reactions to her perceptions of the characteristics of a particular child. To test this assumption, each mother was observed in interaction with two of her children--the target child whose chronological age or level of social competence score served as the basis for the matching of groups and a younger or older nonretarded sibling. Greater differences were expected in the interaction of mothers working with retarded children and older siblings than in the interaction of mothers working with retarded children and younger siblings. For all groups of mother-child dyads, the verbal mediation requirements of the maternal teaching tasks were expected to require qualitatively different kinds of interaction which would be reflected in changes in the kinds of patterns used when tasks were compared.

Analyses of proportion of time in specific patterns were by procedures which determine the amount of the variability in dependent measures attributable to the effects of the independent variables being manipulated. Analyses of proportion of transitions in patterns, however, were primarily by techniques which test for exact equivalence of the two distributions. Hence, "significant" results for time and transition data have some very real differences in meaning and must be interpreted with care.

The research design required the selection of three groups of mothers and children: in the first group each mother worked with a four through six-year-old nonretarded child (Control group), in the second group each mother worked with a trainable retarded child matched with the Control

children on chronological age (Younger retarded group), in the third group each mother worked with a trainable retarded child matched with the Control children on a measure of level of social competence (Older retarded group). In deriving the experimental hypotheses, it was uncertain whether the differences in the interaction of adults and retarded children were the result of the actual limitation in the capabilities of the retarded children or of limitations assumed to exist in one who is labeled retarded. It was for the purpose of providing evidence on these alternatives that the two groups of trainable mentally retarded children were included in the study. The older retarded children were reported to have attained similar levels of functioning in areas of social competence as had the younger Control children. Hence, differences in maternal interaction between these two groups may demonstrate reactions to assumed deviance. Each group was divided into a subgroup of mothers who also worked with a younger sibling of the target child and a subgroup of mothers who also worked with an older sibling of the target child.

Each dyad worked together to complete four tasks. The first three tasks were designed to require different kinds of mediation by the mother whose role was that of leader or teacher. The fourth task was taught to the child out of the mother's sight and hearing. In the dyadic interaction of mother and child, the child's ascribed role was that of teacher as he communicated the task requirements to his mother.

In the teaching situation of this study all mothers relied more on the give and take of interrogation and feedback strategies than on overt presentation of information through direct explanation. Mothers working

with retarded children changed interaction categories in the orientation and motivation of the child more rapidly than did mothers working with nonretarded children. Whether this alternation of motivation, control and orientation was an appropriate strategy which provided more successful focusing of the retarded child's attention on the task to be learned or whether it was inappropriate in that it was too fragmented to be effective in directing the child's attention to relevant aspects of the situation remains to be determined in subsequent research.

The more rapid tempo of interaction in the use of elaborated and restricted patterns for mothers and nonretarded children than for dyads of mothers and retarded children showed more differentiated and more rapidly changing use of teaching patterns with apparently unimpaired children. Since mothers teaching younger retarded children also showed a more rapid rate of change in elaborated and restricted patterns than did mothers working with older retarded children, an effect of the perceived defect of the retarded child that increases with the child's age was indicated. Additionally, a spillover of this shift in teaching strategy appears to occur in the interaction of the mothers and siblings of the retarded children resulting in a level of use of interrogation and feedback patterns which was intermediate to that used in dyads containing retarded children and dyads containing nonretarded target children. Thus, it appears that the presence of a moderately retarded child in the family may not only lead to differences in the way the mother works with him but may also affect her manner of interacting with her other, non-retarded children.

Some results of the study also pointed up problems in the pattern analysis procedures used.

The demonstrated independence of time in pattern and number of transitions in patterns necessitated separate analyses of these two data sources for each hypothesis. When one comparison was significant and the other was not it appeared that the differences between the groups were not in the duration of patterns or in the number of changes in interaction but in the tempo of the mother-child interaction--the rate at which the behaviors changed. Such an indication of more rapid changes within a pattern suggests more differentiation and variability in the pattern per unit of time. The significance of such differences in tempo may not always be the same, since a more rapid tempo may represent an elaborated strategy by providing a more complex and meaningful sequence of verbal and nonverbal behaviors or a restricted strategy which communicates inefficiently because patterns are too fragmented to be effective.

The major hypothesis of the study was that mothers teaching moderately retarded children would use more restricted patterns than would mothers teaching nonretarded children of equal chronological age or level of social competence; use of elaborated patterns was expected to be greater for dyads of mothers and nonretarded children. However, although existing theory and research were used in the definition of the specific sequences of interaction categories chosen as restricted and elaborated patterns, these do not appear to have been totally satisfactory. That is, the distinction of restricted and elaborated patterns in terms of the relative number of occurrences of and the duration of simple, largely

nonverbal patterns and complex, largely verbal patterns ignores one of the primary advantages of elaborated communication patterns--the amount of time and talk saved by these more informative sequences. Additionally, in the dyadic interaction of mothers and older, more capable children (e.g. older siblings of the eleven to thirteen year old retarded children in the study), much of the interaction is nonverbal and cooperative rather than verbally instructive since both members of the dyad readily comprehend the task requirements.

For this reason, the quantitative characterizations of duration of patterns and pattern frequency may not only be insufficient for the purpose of differentiating elaborated and restricted styles but may actually be misleading since truly elaborated patterns need not occur with great frequency or be maintained for long periods of time in order to exert a strong influence on the behavior of individuals. Effort should be devoted to looking for a better dependent variable than time in pattern or number of transitions in pattern. Such a measure might characterize interaction episodes in terms of the most complex patterns used within them. However, any measure chosen should not require ratings of interaction or post hoc judgments of the complexity of sequences by observers but should be applicable to real-time computer-based coding of interaction.

The necessity for additional investigation of the interaction of parents and retarded children by techniques which meet the objections stated above was discussed, and the importance of results of such research for adequate evaluation and modification of parental teaching behavior was stressed.

APPENDIX A

Interaction Coding Scheme

Each change in behavior is recorded by means of a three-digit tally. The first digit coded refers to the person whose actions are being categorized. Code "1" for an action by the mother and "2" for an action by the child. The second and third digits are to be coded according to the following scheme:

VERBAL INTERACTION CATEGORIES

1 Motivation and control

- 11 Verbal control: Action of other is controlled by threat of punishment--overt or implied.
- 12 Engaging: Task-oriented, but not task-specific message used to involve the learner in the task.
- 13 Orienting to task: Tells the other what is to be done, but doesn't give specific information about what is to be done or how it is to be accomplished.

2 Affirmative reply to feedback--approval, confirmation or praise

- 21 Normative criteria given: Upholds the norms of society; learner must uncritically accept his social status and its behavioral standards.
- 22 Personal-subjective criteria given: Reference to feelings, likes or dislikes of learner or others around him.
- 23 Cognitive-rational criteria given: Reasons for praise appeal to rational principles and refer to objective characteristics of the situation or the consequences of various alternatives of action.
- 24 No criteria given

3 Use of other's statement or behavior

- 31 Repetition: Verbatim repetition, rephrasing of other's statement, or report of the other's action.
- 32 Questioning: Request for clarification.
- 33 Elaboration: Other's statement serves as basis for further expansion of an idea or for clarification.

4 Questioning

- 41 Binary question: "Yes"/"No" question, or alternatives (up to 4) are specified explicitly within the question.
- 42 Narrow question: Only one answer is correct or acceptable.
- 43 Broad question: Answer requires selection from a set of possible responses. These are often thought-provoking questions.

5 Providing task-relevant information

- 51 Focus or verbal point: Direct attention to a specific portion of the field, but provide little specific information. Is not used to change or engage the other's attention but merely to direct it.
- 52 Task informing: Provides specific information about the task, but is not specifically elicited by the other.

6 Command

- 61 Compliance to be physical: More than a visual action is required.
- 62 Compliance to be verbal: Learner has no option in his reply.

7 Negative reply to feedback--criticism or disagreement

- 71 Normative criteria given: Societal expectation or behavioral rules backed up by authority are used to justify criticism.
- 72 Personal-subjective criteria given: Criticism is linked to references to feelings and subjective state of individuals--self or other.
- 73 Cognitive-rational criteria given: Rationally-based and objective reasons for criticism are given.
- 74 No criteria given:

8 Verbal response--elicited

- 81 Attempt to respond: Behavior appropriate to other's request is attempted--result may be correct or incorrect.
- 82 Unable to respond: "I don't know" or equivalent.

9 Verbal behavior--unsolicited

- 91 Volunteers unsolicited task-related but unspecific information: This category includes verbal indications of positive task-involvement and satisfaction or dissatisfaction with performance of self.
- 92 Verbal control of own behavior: Individual is verbally directing his own behavior, is giving self directions or summarizing and commenting upon own behavior for own benefit.

10 Task-irrelevant behavior, silence, confusion

- 01 Task-irrelevant communication: Message is away from task-situation; includes conversation with experimenter.
- 02 Silence
- 03 Unintelligible interaction, not mechanical problems
- 04 Uncodable interaction due to mechanical difficulty: Flaw in taping.

NONVERBAL INTERACTION CATEGORIES

1 Point

- 10 All manual actions which are accompanied by verbalization in an attempt to clarify the task-specific verbal message. Both physical and verbal actions are essential in transmitting the message.

2 Demonstration

- 20 Task-specific actions not accompanied by verbal task-specific cues. Verbalization accompanying is, e.g. "I'm going to do this, then this."

3 Physical restriction

- 30 Attempt to restrain the other's actions by touching or reaching for him or holding the test materials away from him.

4 Physical response--elicited by other

- 41 Attempt to respond: Behavior is in response to requests from the other. A nod or a point is scored when it provides a definitive response, not simple agreement.
- 42 Indeterminant: Gestural and other nonverbal equivalents of "I don't know." e.g. a shrug

5 Physical response--elicited by demands of task

- 50 The act is appropriate to the nature of the task (though perhaps incorrect), but has not been specifically elicited by the other person.

6 Task irrelevant behavior

- 61 Irrelevant behavior within situation: e.g. Playing with experimental materials or other materials within the area.
- 62 Attempt to leave situation: Turning away or actual attempt to escape.

7 No response--no codable behavior by teacher or learner

- 70 No physical activity is observable or can be inferred from the verbal interaction of participants.

VERBAL INTERACTION

1. Motivation and control

11 Verbal Control: The teacher is attempting to obtain the learner's cooperation, or direct his action through some implied punishment. The element of implied punishment or threat generally distinguishes this rating. Use of verbal control messages implies that the teacher wants the learner to do things in exactly the way described and that initiative on the part of the learner is discouraged. Control messages need not be task-oriented.

12 Engaging: This is a non-task-specific but task-oriented message used to involve the learner in the task, e.g. "This is a game like the one we have at home." Some kind of rewarding technique is often involved. Engaging also occurs when the teacher talks with the learner about non-task matters during the course of the interaction. For example, talking about lunch, or going home, or a conversation about the tester might all be scored in this category if they are directly motivating. Other such non-task conversation should be rated 01; 12, however, takes precedence over 01. When the learner tunes out and the teacher essentially follows along with the intention of regaining cooperation, the ensuing messages are primarily aimed at motivation. They are scored in this category.

13 Orienting: Such a statement orients the learner and maintains his interest, i.e., tells the learner what is to be done, but it neither gives specific information nor tells how the task is to be done. Two examples are: "The game is to put the blocks in a special way." "Now we'll do it again." Note: messages in this category need not be statements.

A question such as "Shall we do it again?" might also be scored as orienting.

2. Affirmative reply to feedback.

In this case the teacher replies to the feedback received in the previous message with a statement of approval, confirmation, or praise. Generally only the first message following the feedback will be scored as a reply, succeeding statements being placed in the categories into which they would have been placed had there been no feedback.

A statement which is neither clearly positive nor negative should be scored by the predominant nature of the reply. A statement which is truly half positive and half negative which cannot be broken down should be scored as positive, such as "That's almost right."

21 Normative criteria given: If the teacher gives reasons for her praise that uphold the norms of society or of the subcultural group of which the learner is a member, then 21 will be tallied. In this case, the teacher's appeal is for the learner's uncritical acceptance of his social status and its behavioral standards. Examples of this category are: "That's being a good boy." or "You're paying attention like a good boy."

22 Personal-subjective criteria given: When the teacher gives reasons for praise which consider the feeling, likes or dislikes of the learner or others around him, category 22 will be scored. For example, "I'll bet it makes you feel good when you do it right.", "It makes me very happy when you do such a good job" or "Your teacher is very happy with your work." are 22's.

23 Cognitive-rational criteria given: If reasons for praise are given which appeal to rational principles and refer to the objective characteristics

of the situation or the consequences of various alternatives of action, 23 is to be tallied. Examples of this category are: "That is a good answer because you remembered both of the things I told you to do." or "When you sit still and pay attention like that you can remember everything I tell you."

24 No criteria given: If the teacher praises by saying "Good" or "Fine" or "That's right." without giving criteria for the praise, 24 will be tallied.

3. Use of other's statement or behavior

31 Repetition: Behavior categorized as repetition represents a superficial use of the learner's behavior by the teacher. This may take the form of a verbatim repetition, a rephrasing of the learner's statement, or a report of the learner's action. The criterion by which a statement can be placed in category 31 is that the content of the learner's statement be recognizable in the content of the teacher's statement.

32 Questioning: The teacher asks the learner a question based on the learner's own statement.

33 Elaboration: Utterances in this category represent the teacher's use of the learner's statement as a basis for his own statement—generally defining a term used by the learner or expanding the learner's idea.

4. Questioning

41 Binary Question: A question is tallied in category 41 when the appropriate response is a "yes" or a "No" or when a limited number of alternative responses are specified explicitly within the question. For example: "Do you like baseball?", "Is this block red or blue?" or "Do you want chocolate, vanilla, or strawberry ice cream?" would be

41 questions.

42 Narrow question: A narrow question is one for which there exists only one correct or acceptable answer. The teacher's purpose is to elicit factual information from the learner in a recitation-like paradigm for which there is a single right answer in mind. Examples of narrow questions are "What color is this block?" or "What is 8-2?"

43 Broad Question: There are two or more acceptable or correct responses to a broad question. Such questions are usually thought-provoking although they may involve the selection by the learner of a subset of factual responses from a larger collection of facts. For example, "What would you like to be when you grow up?" or "Who were three generals who fought for the South in the Civil War?" are broad questions in the terms of the coding system.

5. Providing task-relevant information

51 Focus or verbal point: This category designates the teacher's attempts to focus the learner's attention on a specific portion of the field. The intention of the speaker is to have the learner orient himself. Care should be taken to distinguish focuses from commands on the one hand and from control on the other. Focuses can be differentiated from informing in that they give very little specific information. They can be distinguished from commands and engaging because there is little positive or negative reward implied in them. A focus is not used to change the learner's attention but merely to direct it, e.g. "Put this one here."

52 Task informing: Here the teacher lectures or imparts any specific information about the task--not specifically elicited by the learner.

This category includes statements of fact, opinions about content or procedure, expression of ideas and rhetorical questions.

6. Command

Whether or not a message contains new information, if it contains a command that the learner do something, it is tallied as a command.

61 Compliance to be physical: A physical command is scored whenever the teacher demands that the learner do anything physical. It must be noted that this category is used only when more than a visual action is required of the learner. A visual action alone is scored under Focusing or Verbal Point, category 51.

62 Compliance to be verbal: Here the command is that the learner respond verbally. This is distinguished from a question in that the learner has no option in his reply. A statement beginning "Tell me..." is generally in this class. The content might range from a simple request for affirmation of understanding to requiring specifics about the task.

7. Negative reply to feedback

71 Normative criteria given: This category is scored when the teacher gives societal expectation or behavioral rules backed up by authority as the justification for criticism. As with positive feedback, normative criteria require the learner to accept the behavioral standards associated with his social status without questions. Examples of this category are: "Don't talk back to me, I'm your mother.", "Big boys don't cry." or "Don't hit anyone smaller than you."

72 Personal-subjective criteria given: When the teacher links criticism with references to the feelings and subjective state of the learner or others around him, category 72 is to be tallied. For example: "Aren't

you ashamed of yourself when you don't listen?" or "It hurts my feelings when you interrupt me."

73 Cognitive-rational criteria given: If reasons for criticism which appeal to rational principles and refer to the objective consequences of various alternatives of action are given, 73 is to be coded. Examples of this category are: "No, you forgot to put the blue ones in a separate pile." or "If you keep on running in the hall you will disturb people in the offices nearby."

74 No criteria given: If the teacher simply says "Wrong" or "That's a bad answer" without giving justification for her response, 74 is tallied.

8. Verbal response--elicited.

81 Attempt to respond: In this case the learner attempts to deal with the requirements of the situation by meeting the teacher's request for a specific behavior. This response may be wholly or partially correct or completely incorrect, depending on the learner's understanding of the situation. Nevertheless, he has tried to provide the behavior appropriate to the teacher's question or command.

82 Unable to respond: The learner indicates verbally that he does not understand what is going on, as by saying "I don't know." or some statement indicating his realization that he doesn't know how to answer.

9. Verbal behavior--unsolicited.

91 Volunteers unsolicited task-specific information: Note that to be rated in this category, the information must be relevant. It may refer to a different aspect of the situation, or it may change the subject or

stop the communication. The learner is, in a sense, taking over the role of teacher by volunteering task-specific information. In this sense he is probably jumping ahead of the situation. This is not feedback in the strictest sense, but it does give the teacher information about the learner's understanding or progress.

92 Requests task-specific information: In this case the learner requests further information about the task, presumably to increase his understanding.

10. Task-irrelevant behavior, silence, confusion.

01 Task-irrelevant communication: This type of communication occurs when the teacher's message is "away" from the task situation. It may follow the learner's non-task communication or may initiate non-task communication. It is distinguished from engaging, in that the teacher in this type of message does not attempt to motivate the learner toward the task. A good question to ask in coding a non-task as opposed to engaging message would be, "Does this statement attempt to get the learner to work on the task?" If it does not, for example, "That's a typewriter," then it is non-task communication (01). This rating takes precedence over 8 (verbal response-elicited) when the information contained is non-task-oriented. This rating also occurs when an S engages in conversation with the tester, whether to ask a question or to respond.

02 Silence: This category refers to those situations in which neither the learner nor the teacher is sending any verbal signals.

03 Unintelligible interaction, not mechanical problems: Within this category are periods of time when teacher and learner are speaking at the

same time and periods of time when the speech of either learner or teacher cannot be understood.

04 Uncodable interaction due to mechanical difficulty: A period of time when flaws in the taping make categorization impossible.

NONVERBAL INTERACTION

1. Point

This class includes all manual actions of the teacher which are accompanied by verbalization. It is an attempt to clarify the task-specific verbal message. Note: If the teacher demonstrates while using verbal clues, the demonstration is nevertheless scored as a "point." The important fact is that when a point accompanies a verbal message, both the physical and verbal actions are essential in transmitting the message.

2. Demonstration

This is a series of task-specific actions carried out by the teacher, but not accompanied by verbal task-specific cues. Thus the teacher may say such things as "I'm going to do this, then this." The rationale here is that the demonstration should be coded because the major amount of information is being transmitted by physical actions rather than words.

3. Physical restriction

This category is used only when the teacher actually touches or reaches for the learner or holds the test materials away in an attempt to restrain his actions. One must be careful, however, to determine when a physical restriction changes to a point (10). Physical restrictions are used to orient the learner to the task activity when he is either inattentive or performing incorrectly by holding back an item, the teacher may keep the learner from placing it incorrectly. As soon as

he is told where it goes, however, the action becomes a point.

4. Physical response--elicited by other

Behaviors in this class are in response to requests from the teacher.

The expected physical response might be accompanied by a verbalization. It is possible that the learner will nod or point in response to a question. In such cases this category is used when the question was task-specific and the gesture is definitive. If the nod indicates simple agreement it is coded 61.

41 Attempt to respond: This category encompasses nonverbal actions by the learner which have been elicited by requests or commands from the teacher.

42 Indeterminant: This category includes gestured and other non-verbal equivalents of "I don't know.", e.g. a shrug.

5. Physical response--elicited by demands of task

In this case, the individual is performing an act which is appropriate to the nature of the task (although not necessarily correct) but which is not specifically elicited by another person. For example, in the Etch-A-Sketch task, when the mother turns the knob which she controls in order to complete her parts of the designs, her act is to be coded 50.

6. Task irrelevant behavior

61 Irrelevant behavior within situation: This category encompasses such behaviors as playing with the experimental materials or with other materials within the room.

62 Attempt to leave situation: In this case the child behaves physically by tuning out. The mother receives the information that the child is not task-involved and that the mother is not communicating. It may be behavior such as turning away or it may be an actual attempt to leave the experimental area.

7. No response--no codable behavior by teacher or learner

This category is scored when no physical activity is observable or can be inferred from the verbal interaction of teacher and learner.

APPENDIX B

Family Information Sheet

Parents' names _____

Address _____

Phone _____

Children in the family (Please list names and birthdates)

Father's occupation _____

Level of schooling attained:

	<u>Father</u>		<u>Mother</u>	
Grade school completed?	Yes	No	Yes	No
High school attended?	Yes	No	Yes	No
Diploma?	Yes	No	Yes	No
Technical training?	Yes	No	Yes	No
Beyond high school diploma?	Yes	No	Yes	No
College attended?	Yes	No	Yes	No
Bachelor's degree?	Yes	No	Yes	No
Graduate college work?	Yes	No	Yes	No
Master's degree?	Yes	No	Yes	No
PhD or other doctorate?	Yes	No	Yes	No

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